Journal
OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

AVMA Convention—San Antonio, Oct. 15-18, 1956

Symposium from Conference of Equine Practitioners

Experimental Studies Relative to the Therapeutic Use of Ultrasound—*Herrick—Janes—Ardan* 571

Nasal Irrigation in the Treatment of Nasal Catarrh and Sinus Infections in Horses—*Paul J. Meginnis* 577

Surgical Removal of Fracture Fragments of the Proximal Sesamoid Bone—*E. A. Churchill* 581

Local Anesthesia and Applied Anatomy as Related to Nerve Blocks in Horses—*Getty—Sowa—Lundvall* 583

General Articles

Objective Examinations in Veterinary Medicine—*Charles B. Frasher* 588

Clinical Data

Parakeets in Veterinary Practice—*G. A. Evans* 593

A New Method of Application of Pigeon Pox Vaccine—*Tevis M. Goldhaft* 596

Incidence of Leptospira in Horses—A Laboratory Report—*M. Schlichting and Rosaltha H. Sanders* 601

Melanoma of Eye and Oral Mucosa with Metastases in a Dog—*Leo L. Lieberman* 602

Some Observations on Further Attempts to Transmit Equine Infectious Anemia to Lambs and Pigs—*C. D. Stein and J. R. Songer* 604

What Is Your Diagnosis? 609

The Pathogenesis of Canine Histoplasmosis—*Jan Schwarz and Eula L. Bingham* 611

Toxicity Studies on Captan-Treated Corn in Pigs and Chickens—*Link—Smith—Morrill* 614

Editorial

The American Association of Equine Practitioners—Its Objectives 617

The News ..... 620 **Organization Section ..... adv. p. 20**

Washington News, adv. p. 12; Coming Meetings, adv. p. 24

Contents continued on adv. pages 2 and 6

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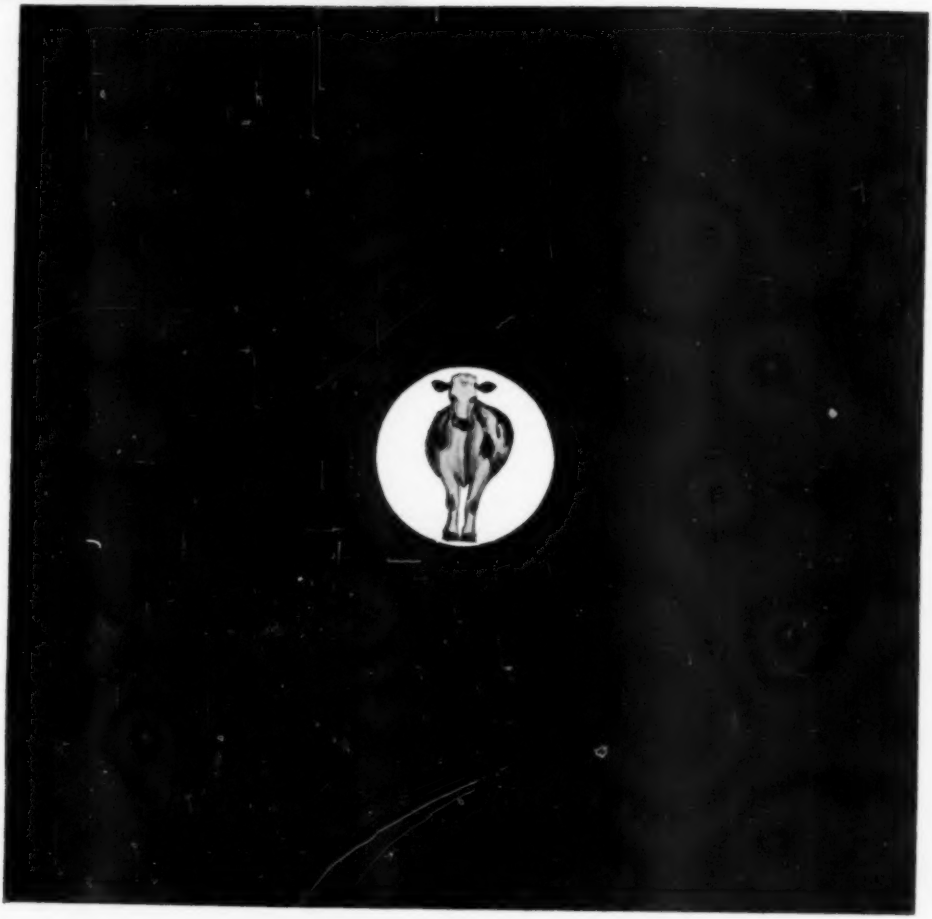

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CONTENTS

Continued from Cover

CLINICAL DATA

Parakeets and Where They Came from 595
Tetanus Toxoid Antitoxin Levels 595
Virus Pneumonia in Lambs 595
BHC Poisoning in Horses 595
Promazine Hydrochloride 595
Pox in Cows from a Vaccinated Child 601
Re-Tattooing Vaccinated Calves 601
"Silo-Filler's Disease" in Animals 602
Aujeszky's Disease in Cattle 602
Aftosa in Spain 608
Anticoagulants and Vitamin K_1 616
Phenothiazine and the Ox Warble 616
Rabbit Antibodies and Plant Viruses 616

Washington News (continued from adv. p. 12) 618, 619

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CONTENTS—Continued

THE NEWS

Laboratory Refresher Courses 620
Annual Meeting of American Animal Hospital Association 620
Commencements 620
U. S. Government 622
Among the States and Provinces 623
Foreign News 624
State Board Examinations 624
Deaths 624

MISCELLANEOUS

Immunizing Mink Against Botulism, 592; Nasal Air Conditioning, 592; It's Time to End Hog Cholera, 592; The Brucella Abortus Ring Test, 592; Brucellosis Ring Test Limitations, 592; Trichinosis in Man in Pennsylvania, 592.

ORGANIZATION SECTION

Ninety-Third Annual AVMA Convention ..... adv. p. 20
Women's Auxiliary ..... adv. p. 22
Student Chapter Activities ..... adv. p. 22

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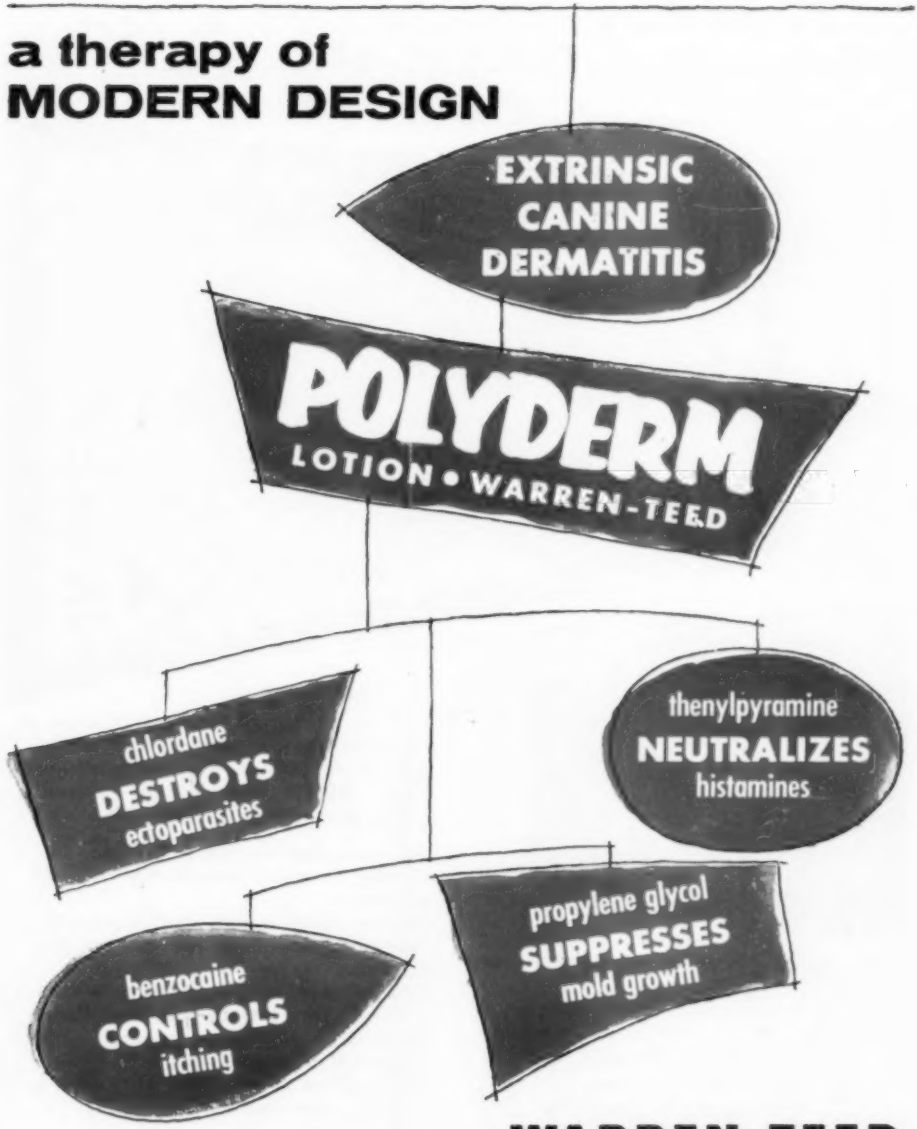

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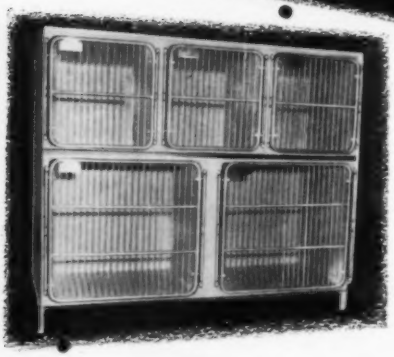

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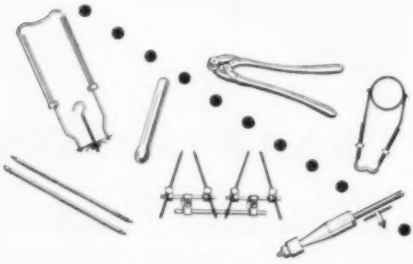

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ARMOUR

News From Washington

All resources available to the AVMA, from within the profession and from allied groups, are actively mobilized to prevent the abolishment of the Veterinary Corps as directed by Defense Secretary Charles E. Wilson (see June 1, JOURNAL, P. 566).

The following statement of Veterinary Corps activities and mission appearing in the transcript of the Hearings before the Subcommittee on Department of Defense Appropriation, Thursday, April 19, 1956, is presented for the record. AVMA members are urged to use these facts in creating a greater public awareness of the value of veterinary services in the Armed Forces.

1) GENERAL

The status of the Army Veterinary Corps with reference to its functions and responsibilities has not changed during recent years. These are defined and delineated in AR 40-90, Oct. 23, 1950. Briefly, they are concerned with:

a) inspection of food products of animal origin and sources thereof procured and issued for troop consumption;

b) investigation and control of diseases common to man and animals;

c) care and treatment of military animals.

2) MISCONCEPT OF FUNCTIONS

The question has been raised as to the assigned functions and responsibilities of the Veterinary Corps, particularly in the area of food inspection, as well as expressing doubt that the inspection of meat-food products intended for human consumption was a proper sphere of veterinary activity, military- or civilian-wise. Also apparent is the impression that the inspection of food products by the Veterinary Corps is a mission recently acquired to justify the continued existence of the Corps, in view of the drastic reduction in military animal strength.

The inspection of meats and meat products for wholesomeness has been a function of graduate veterinarians since the genesis of meat inspection in the United States by federal, state, and municipal governments. The inspection of food products of animal origin intended for troop consumption has always been an assigned function and responsibility of the Army Veterinary Corps, since the Corps was established by an act of Congress on June 3, 1916.

It is correct that the food-inspection activities of the Veterinary Corps have increased in recent years, but any increase has been directly proportional to the increased size of the military establishment and not to offset the reduced requirement for veterinary care of military animals. These activities have also been influenced by:

a) increased variety and complexity of the soldier's ration;

b) increased number of troops stationed in overseas areas and policy to procure subsistence from indigenous sources to assist in foreign-aid programs;

c) centralized food procurement responsibility of the Quartermaster General for the three military departments.

3) RATIO OF VETERINARY CORPS OFFICERS TO TROOP STRENGTH

Although the food-inspection responsibilities of the Veterinary Corps have increased for the reasons stated above, the actual number of Veterinary Corps officers assigned to food inspection was approximately 50 per cent less on the basis of troop strength in 1956 than in World War I. Table 1 reflects this situation.

4) FOOD INSPECTION VERSUS VETERINARIANS

Veterinarians have been employed by the Army as food inspectors since 1901, following the disastrous food-poisoning outbreaks among United States troops in the Spanish-American War. They have been employed to care for sick and injured animals since the Civil War. In 1916, the Congress sought to consolidate the veterinary service, United States Army, and increase efficiency, and legislated to establish the Veterinary Corps, thereby incorporating both food inspection and animal

(Continued on p. 618)

TABLE 1—Strength of Veterinary Corps Compared to Troop Strength

	Strength of Veterinary Corps	No. V. C. officers assigned to food inspection	Troop strength	Ratio of V. C. officers (assigned to food inspection) and troop strength
World War I	2,234	780	3.5 million (total Army)	1:4500
World War II	2,150	1,720	12.3 million (total Armed Forces)	1:7150
1955	473	343	3.2 million (total Armed Forces)	1:9300
1956 (June 30, '56)	466	332	2.9 million (total Armed Forces)	1:8735

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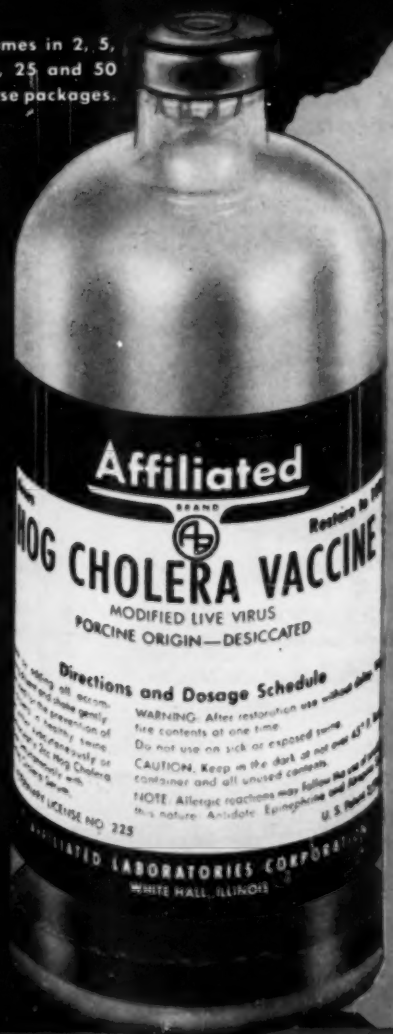

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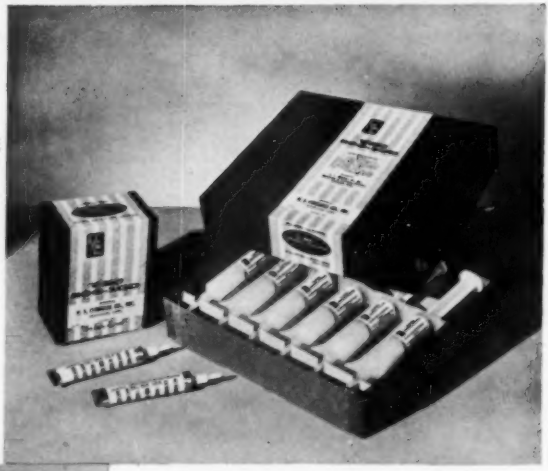

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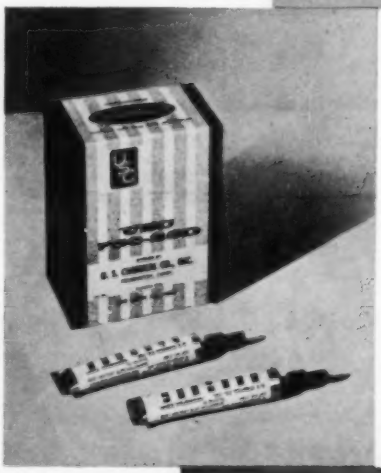

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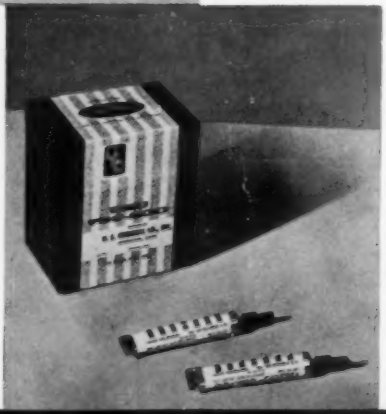

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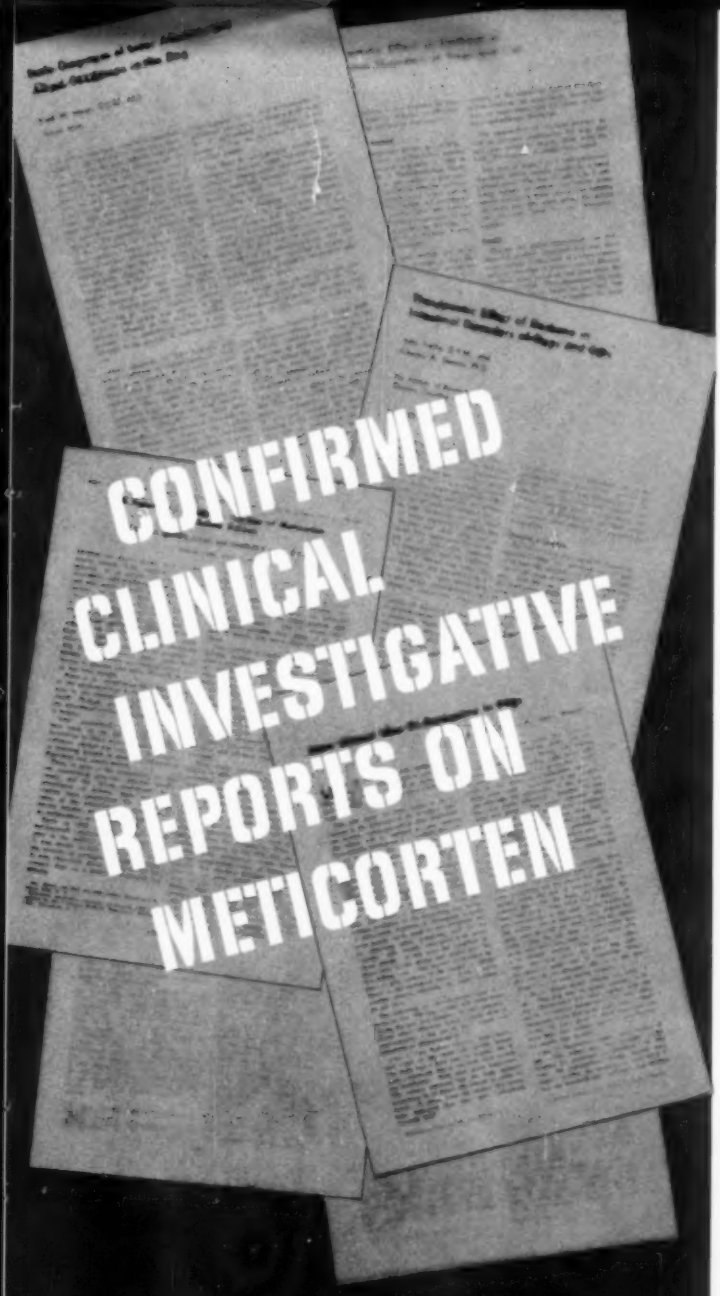

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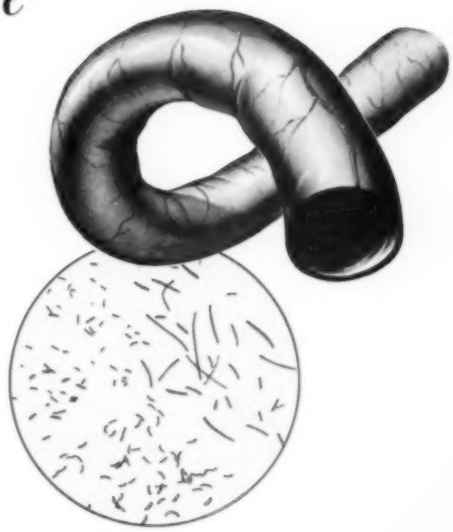

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Experimental Studies Relative to the Therapeutic Use of Ultrasound

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This article and the following three articles were presented at the meeting of the American Association of Equine Practitioners in Chicago, Dec. 16-17, 1955, and are published here as a symposium (pp. 571-587).

WHENEVER a new therapeutic agent is envisaged, a responsibility with regard to its possible misuse should be considered seriously. In the case of ultrasound (a relatively new therapeutic agent), one has only to read certain advertisements dealing with this agent to realize that undesirable procedures for introducing a therapeutic agent have been at work. Ultrasound, like audible sound, is vibratory mechanical energy. The frequencies of the vibrations are higher than the highest frequency audible to a human being and, therefore, are characterized by the term "ultrasound."

If any new agent is outstanding in bringing benefits to a patient, obviously no time should be lost in making therapeutists familiar with the agent. The question arises: Should this responsibility for publicizing the benefits be assumed initially by the manufacturer? Everyone realizes that a busy clinician can not take time to make a thorough and complete investigation of new therapeutic agents previous to any clinical application. The various clinical organizations should have available some reliable and central authority which can be of service to each member of the society.

Perhaps the idea that we are trying to emphasize at the moment, namely, a satisfactory and reliable understanding of a new therapeutic agent, can be portrayed best by describing some of the studies which were made in our laboratory before any clinical application of ultrasound was made. In describing these studies, we do not wish to imply that they followed the best plan for such an investigation. No doubt superior methods may be described by more competent investigators in the field of ultrasonics.

INITIAL EFFORTS

Actually, it was a veterinarian* who instigated the impetus for procuring our first ultrasonic generator. He wished to test its effect on an old dog, a family pet, on which a diagnosis of malignancy had been made. At that time, ultrasound was being widely publicized because of the favorable results obtained with it against malignant processes. We had at the Institute of Experimental Medicine all the facilities, including scientific investigators, for confirming these published reports—all except the source of ultrasound.

It took some time to procure an ultrasonic generator. In the meantime, a re-

From the Section of Biophysics and Biophysical Research (Herrick), and the Section of Orthopedic Surgery (Janes), Mayo Clinic and Mayo Foundation; and fellow in orthopedic surgery (Ardan), Mayo Foundation, Rochester, Minn. The Mayo Foundation is a part of the Graduate School of the University of Minnesota.

This paper was read at the meeting of the American Association of Equine Practitioners, Chicago, Ill., Dec. 16-17, 1955.

Figures 2a (left), 2b (left), 2c (left), and 2f (left) are reproduced with permission from: Ardan, N. I., Jr., Janes, J. M., and Herrick, J. F.: Changes in Bone After Exposure to Ultrasonic Energy. Minnesota Med., 37, (1954): 415-420.

*Dr. Carl F. Schlotthauer, Section of Veterinary Medicine, Mayo Foundation, Rochester, Minn.

search team was organized. The team was composed of a biophysicist, a physiologist, and two doctors of veterinary medicine, one of whom was a clinician and the other an experimental pathologist. Various types of malignant tumors (spontaneous and transmissible) in dogs, mice, rats, and chickens were available for our investigations.

The results of a rather extensive investigation were most disappointing. We failed to confirm the results that had been so widely publicized elsewhere. At a later time, a more intensive study of the effect of ultrasound on the transmissible Walker rat carcinoma was made, the results of which have been published.[14]

During these studies, we did learn that ultrasound has dangerous potentialities. Animals became paralyzed. Tissues other than the tumor itself were injured. Later, we learned that bones could be fractured with ultrasound.

These undesirable effects deserved further investigation before any consideration could be given to a clinical application of ultrasound.

TECHNICAL FACTORS

It, thus, became necessary to look more deeply into a quantitative understanding of ultrasound, its propagation characteristics within tissues, measurements of dosage, optimal frequencies for therapy, and so forth.

First of all, it was necessary to measure the output of the generator itself in order to be sure that the magnitude of the source of ultrasonic energy would not vary from day to day. If variations did occur, the change in magnitude of the output should be determined. Second, the energy pattern of the generator should be known, so that the ultrasound could be used as intelligently as possible. With strict attention to maintaining as constant a technique as possible, so as to ensure constant conditions for experiments, reproducible results were difficult to obtain. One of the major problems in experimental procedures with ultrasound is to reproduce the observed results quantitatively.

A cross section of the radiation field pattern of the usual ultrasonic generator available for clinical use is bell-shaped (fig. 1). Such a pattern indicates that special care is necessary in order to direct the maximal energy toward the site to be irradiated. Even a slight shift in position of the ultrasonic head causes marked variation in the intensity of ultrasound which reaches the desired site in the tissues.

If a stationary technique is used, extreme care in positioning must be taken. A moving technique may be adopted to overcome this difficulty, but the energy which the tissue receives when the moving technique is utilized is more difficult to evaluate. Methods for measuring dosage accurately thus far are in the developmental stages. As yet, experts in this field have not arrived at a completely satisfactory standard, so far as therapy is concerned.

Proper coupling of ultrasonic energy to the desired tissue is most important. This aspect of the problem requires an appreciation of a parameter known as "acoustic impedance." When the acoustic impedances of two mediums are the same, maximal ultrasonic energy is transferred from one medium to the other. When these acoustic impedances are not the same, part or all of the energy is reflected back toward the source and, consequently, little or no energy may reach the desired site.

The acoustic impedance of muscle is approximately equal to that of water. In other words, when water is used as a coupling agent, a good transfer of ultrasonic energy from the water to the muscle takes place. The water must be degassed, however. Tap water may contain bubbles of air which cause considerable loss in ultrasonic energy during propagation of the energy between the sound head and the site to be irradiated. Fortunately, ultrasound degasses the medium through which it is propagated, and this property of ultrasound may be used advantageously before any therapeutic procedure is started.

Mineral oil is a satisfactory coupling medium and, although it is not as good as degassed water, it is frequently more convenient than water in the clinical application of ultrasound. Various other coupling mediums also are recommended. High-frequency ultrasound can not be transmitted through air without great loss. Hence, air can be used as a shield for protecting certain body structures from possible injuries caused by ultrasound.

MISMATCHES OF ACOUSTIC IMPEDANCES

The physician who is using ultrasound for therapy can control the matching of the acoustic impedance of the coupling me-

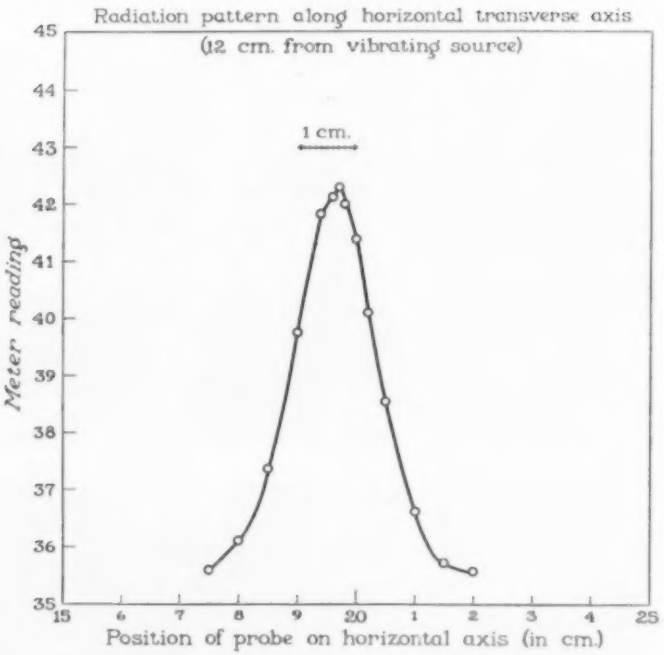

Fig. 1—Cross section of field pattern produced by an ultrasonic generator designed for use in therapy. Note the narrow region at maximal ouput.

dium to that of the surface tissues but he has little or no control over the mismatches of acoustic impedances which occur within the living body. Perhaps the greatest mismatch of acoustic impedances within the living body occurs at the interface between tissue and air.

We have made some observations on the effects of ultrasound at tissue-air interfaces along the intestines of the rat.[9] At such an interface, the reflection of the sound energy may be as high as 100 per cent. This means that the ultrasound passes again through the intestinal wall, which is thereby exposed to at least twice the energy that would be received if the acoustic impedances were matched. Burns of the intestinal mucosa have been observed at such sites. Petechial hemorrhages also occur. A histological study of these petechial hemorrhages has shown localized ruptures of blood vessels. Such localized ruptures have been attributed to a phenomenon called "cavitation."

Another vulnerable site where a mismatch of acoustic impedances takes place is the interface between soft tissue and bone. At such an interface, the reflected ultrasonic energy is scattered and, hence, is more easily absorbed. This situation causes considerable heating. Two additional factors may play an important role in the heating of bone: (1) high absorption of the ultrasonic energy by the bone itself, and (2) the transformation from the longitudinal wave (the characteristic means of propagating ultrasonic energy through fluid mediums) to a transverse wave. The transverse wave is a shear wave which is attenuated rapidly, thereby causing a marked heating effect.

In a manner of speaking, this mismatch of acoustic impedances at the interface between soft tissue and bone may be considered a very fortunate circumstance because the marked heating effect gives rise to excruciating pain. This pain, which physicians regard as a warning signal for decreasing the intensity of the ultrasound, is (according to authorities in this field) caused by the heating of the periosteum by the ultrasound. The question naturally arises: What is the warning signal when the patient is anesthetized?

EFFECTS OF ULTRASOUND ON BONE

Before serious consideration could be given to the clinical application of ultra-

Fig. 2—Changes, shown roentgenologically, in the femurs of an experimental dog after three five-minute exposures to 20 watts of ultrasonic power from a radiating surface of 10 sq. cm. Frequency of ultrasound was 800 kilocycles per second. A rest period of five minutes was allowed between the successive exposures.

a—Left and right femurs before exposure to ultrasound. Guiding thermocouple in place.

b—Femurs ten days after exposure to ultrasound, showing periosteal reaction and osteoporosis. Aeras of liquefied fat may be seen in the soft tissues.

Figure 2—continued

c—Femurs 15 days after exposure to ultrasound, showing (left) fracture at lower end of necrotic segment; (right) more periosteal reaction than in figure 2 b.

d—Femurs 23 days after exposure to ultrasound, showing (left) complete dissociation of necrotic fragment from distal femoral fragment; (right) progressive periosteal reaction and beginning sequestration of necrotic fragment.

e—Femurs 37 days after exposure to ultrasound: (left) essentially the same as in 2 d; (right) beginning dissociation of the necrotic fragment from the proximal femoral fragment can be seen.

f—Femurs four months and 22 days after exposure to ultrasound: (left) further resorption of necrotic fragment—note reduction of periosteal formation of new bone as compared with figure 2 e; (right) progressive resorption of necrotic fragment, excessive periosteal formation of new bone.

g—Femurs one year, one month, and 28 days after exposure to ultrasound, showing (left) almost complete resorption of necrotic fragment; (right) further resorption of necrotic fragment.

sound, we found it necessary to investigate thoroughly the effects of ultrasound on bone.[4,12] It is known that very high temperatures can be produced in bone by ultrasound. It is possible to prevent the development of such high temperatures, either by moving the sound head itself or by pulsating the source of the sound and, obviously, by decreasing the output of the ultrasonic generator.

Before any new ultrasonic agent is used clinically, it seems advisable to learn the undesirable effects of high intensities, so that intensities above a dangerous level may be avoided, unless irreversible changes are indicated for therapy. The proper procedures for producing the desired therapeutic effect should be learned.

With this in mind, we undertook an intensive study of the effect of ultrasound on the bones of the dog. We had made a thorough study of the temperatures developed in bone by ultrasound, using the three techniques employed clinically, *i.e.*, stationary, moving, and "pulsating." We had produced fractures by ultrasound. We had observed formation of new bone after applications of ultrasound.[5]

We wished to follow the changes which occurred over a prolonged period. These changes were observed roentgenologically and histologically. The results of these studies may be found in a thesis by one of us (Ardan).[1] Abridgments of this thesis have been published.[2,3] Important changes that were observed roentgenologically in both femurs of a dog over a period of 14 months after a single series of exposures on a given day may be seen in figure 2. Three successive exposures of five minutes' duration, with a rest interval of five minutes between exposures, were made. The total output of the ultrasonic generator was 20 watts, and the radiating surface was 10 sq. cm. The frequency was 800 kilocycles.

An ultrasonic probe is required for directing ultrasonic energy accurately toward the desired site *in vivo*. A needle-type thermocouple serves satisfactorily as an ultrasonic probe in this instance. The diameter of the probe should be small in order to avoid any interference with the normal radiation pattern of the ultrasonic field.

The pathological changes resulting from exposure to ultrasound were periosteal reaction, sequestration, complete dissociation (in 1 femur) of the fractured fragments with nonunion and, finally, progressive resorption of the initial periosteal formation of new bone and of the necrotic segment of bone (fig. 2). The histological changes are described in a previous paper.[2] In the same paper, a more detailed account of the changes observed roentgenologically may be found.

Analgesic Effects of Ultrasound

The analgesic properties of ultrasound have been publicized by certain physicians who used ultrasound for therapy. We made a fairly intensive study of the effect on the sciatic nerve of the frog with the hope of procuring data which would confirm objectively the analgesic property of ultrasound.[7,16,17] We failed to find satisfactory evidence for the reported analgesic effects but such properties may not have been obvious under the conditions of our investigations. Additional research should be pursued on nerves of mammals and also, if possible, on nerves the condition of which simulates the pathological conditions which responded favorably clinically.

Heating Effects of Ultrasound

The investigations which have been carried out in our laboratory have emphasized the heating effects of ultrasound. Although these effects have dangerous potentialities, they can be controlled to a large extent and kept within the limits useful for heat therapy. It is not unusual to make good use of therapeutic agents which are very dangerous when improperly used. The question naturally arises: If heat is the principal effect of ultrasound, why use ultrasound for heating when several other agents are already available which are satisfactory clinically? In answering such a question, it is important to state that ultrasound possesses a unique type of heating, that is, structural heating.[15]

Nonthermal Effects of Ultrasound

Unlike some other sources of heat therapy, ultrasound produces nonthermal effects.[8] These nonthermal effects have not been investigated in our laboratory and, for this reason, we shall not assume the responsibility of describing them. However, there is one effect which we have observed, and that is the degassing effect.[6, 8, 10, 11, 13] We have observed this particularly when exposing enucleated eyes of rabbits to ultrasound when oil is employed as the coupling medium. Degassing of living tissues may occur elsewhere when ultrasound is

used. Such degassing effects are highly destructive.

COMMENT

Before this discussion on the biological effects of ultrasound is concluded, it is important to emphasize that ultrasound is slowly finding a definite place among the therapeutic agents used by physiatrists. The best use can be made when the therapeutist possesses a thorough understanding of what ultrasound is, how it behaves within the body, what doses are safe, and what are the contraindications.

The use of ultrasound in medicine is not limited to therapy. It promises to become a valuable diagnostic tool and it may prove to be useful in certain biological measurements, such as the velocity of blood, diameters of blood vessels, and viscosity of blood.

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Nasal Irrigation in the Treatment of Nasal Catarrh and Sinus Infections in Horses

PAUL J. MEGINNIS, D.V.M.

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Nasal irrigation with drugs such as zinc chloride, zinc sulfate, copper sulfate, and zinc sulfocarbolate (in an aqueous base) were used many years ago for the treatment of chronic nasal catarrh in the horse. Percivall,[1] writing in 1853, does not mention nasal irrigation but does mention irrigation of the frontal maxillary sinuses following surgery. Robertson,[2] in 1883, and Gresswell,[3] in 1890, described nasal irrigation with the above-mentioned drugs using an enema syringe or a Rey's funnel to introduce the medicaments into the nasal passages.

Nasal catarrh, a symptom of sinusitis, is common in the race horse, at least, in the areas with which we are familiar (Chicago and New Orleans). While infection is probably the most important etiological factor in the cause of sinusitis, high humidity, the season of the year, drafty barns and stalls, and dusty hay or bedding are contributing factors. The affected horses we have encountered have been treated with antibiotics; therefore, we believe the infections have been minimized and the contributing factors mentioned play an important part in the aggravation of the condition.

The discharge in nasal catarrh and sin-

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This paper was read at the meeting of the American Association of Equine Practitioners, Chicago, Ill., Dec. 16-17, 1955.

Sharpe and Dohme of Merck and Co., Inc., Philadelphia, Pa., furnished the pancreatic dornase used in the nasal irrigations in the treatment of purulent sinusitis.

usitis can be described as three types: purulent, mucopurulent, and catarrhal. A purulent nasal drainage is more apt to occur in animals that have gone through the "shipping fever-influenza" syndrome of respiratory infections. This is especially true with yearlings and 2-year-olds when they are moved into areas where there is a large concentration of horses. The purulent drainage that follows an acute attack of a respiratory infection may persist, sometimes intermittently, for varied periods of time.

Most horses recover from a purulent sinusitis following the administration of one or more courses of antibiotic therapy. However, for the past several years, we have seen from 1 to 6 horses per year with a persistent purulent nasal discharge, more unilateral than bilateral. Following an acute attack of the anterior respiratory tract, the nasal discharge is generally always bilateral but, as the condition progresses, the frontal and maxillary sinuses on a given side may recover more rapidly, resulting in less drainage from that side.

Chronic purulent nasal discharge can also be a sign of other localized infections, such as when alveolar periostitis accompanies infection of the last four upper cheek teeth, in which case, the discharge will be unilateral. A caries odor from the infected tooth or teeth, as well as radiographs, will aid in the diagnosis.

Necrosis of a turbinate bone or bones will also result in a purulent nasal discharge from the affected side. The discharge may contain sequestra and the visual aid of a diagnostic light will assist in making the diagnosis.

A guttural pouch abscess or other infections in the region of the pharynx or larynx can result in nasal discharge. Kral[6] recommends the use of a laryngoscope in diagnosing infections in the region of the pharynx, larynx, and guttural pouches.

In infections in the pharyngeal area, enlargement of the mandibular lymph nodes, as well as the parotid and submaxillary salivary glands, may be observed externally. The nasal discharge, when present, will be bilateral and will usually contain particles of feed. In addition, it is not uncommon to observe that water returns through the nasal passages while drinking. An accurate diagnosis is important because the treatment to be described (nasal irrigation) would have no effect on cases such as alveolar periostitis and would be contraindicated in guttural pouch or other infections in the region of the pharynx and larynx, since nasal irrigations might add to the choking hazard.

When a purulent nasal discharge is present following an acute respiratory infection, several days might elapse before the character of the discharge changes but, from a purulent stage, it will gradually become mucopurulent and, finally, catarrhal. More cases of the latter type are encountered. Furthermore, the presence of a catarrhal sinusitis can influence the racing performance of a horse.

The affected animal will appear normal except for an occasional discharge of a viscid-watery type or of clear mucous plugs. The latter, in my opinion, is more apt to affect the stamina of a race horse because the mucous mass can interfere with air passage, contributing to anoxemia. During a workout or a race, one or more of these mucous plugs may pass out of the nasomaxillary opening into the nasal passage(s). Since it is assumed that the force of air in the nasal passages is greater during inspiration than during expiration, the mucus is more apt to be aspirated into the pharynx during inspiration than expelled during expiration. If the amount of mucus is excessive, the animal may choke, and the discharge may be seen coming from the nostrils. If the mucus is tenacious, small quantities coming in contact with the soft palate or epiglottis may produce slight signs of choking. However, usually of greatest importance is the anoxemia due to interference with air passage.

EQUIPMENT

Our use of nasal irrigation therapy for nasal catarrh and sinus infections began several years ago. We had observed two types of equipment being used by others: a large bulb syringe with a rubber nozzle or an oxygen tank connected to an atomizer.

It seemed that most operators were too energetic when using the bulb syringe; horses resisted the irrigation and it usually resulted in a copious nasal discharge within 24 hours. Irritation by the drugs used in the irrigating solutions probably had more to do with the increased discharge than did the method of treatment. However, the latter could be criticized because of the possi-

bility of the solution entering the pharynx with enough force to produce strangulation and aspiration. Mechanical pneumonia had been known to result. No unfavorable impressions were formed from the oxygen tank-atomizer type of equipment.

Our equipment[4] (fig. 1) is a vacuum-pressure air condenser with a ¼-horsepower motor operating from a 110-volt AC line. The air hose between the compressor and atomizer is 8 feet long, allowing for considerable movability by the operator. The atomizer is a glycerin type, having a 1-oz. glass chamber for the medicament, attached to which is a 7/16-inch soft rubber nozzle 18 inches long. The amount of air pressure is recorded by a gauge and controlled by means of a set screw.

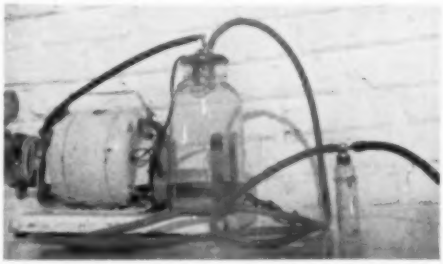

Fig. 1—Equipment used for nasal irrigation of horses.

TECHNIQUE

The screw is set so the gauge reads practically zero which results in a splashing effect, not a spray. A horse would probably inhale much of the spray, while the method here described limits the irrigant largely to the nasal passages.

It is easier to treat the horse in its stall but a little time should be allowed to let the patient become acquainted with the apparatus. The irrigating solution is warmed to body temperature, the atomizer chamber is filled, and the current is turned on without introducing the nozzle into the nasal passages. The atomizer is brought close to the head of the horse so it may see and hear it bubbling, as well as hear the noise from the compressor. If patience is used, only about 1 out of 10 animals will require a twitch.

The current should then be shut off and the nozzle of the atomizer introduced about 6 inches along the floor of the ventral meatus. The current is then turned on and two to three minutes taken to irrigate 1 oz. of the solution into the nasal passage. If the pretreatment discharge is more copious on one side, 2 to 3 oz. is used on that side.

Treatments are repeated on the average of about twice a week until the nasal discharge stops. Mild cases of catarrhal sinusitis are usually benefited by one or two treatments, while a purulent sinusitis may take several treatments. No two cases react similarly. The season of the year and climatic changes can affect results considerably; high humidity seems to slow recovery more than cold temperatures and recovery is usually more rapid during the dry periods of the summer.

Following each treatment, if pasture for grazing is not available, the feed should be placed on the floor to take advantage of drainage by gravity. If the hay is dusty or the season extremely dry, the hay should be sprinkled with water just before it is fed. If the season is cold or damp, drafts in the stall must be eliminated.

DRUGS

In the irrigating solutions, three antibiotics and one enzyme were used. The base solution for the antibiotics is glycerin and normal saline, equal parts. Solutions of penicillin, streptomycin, penicillin-streptomycin, and tyrothricin have been used. The latter is preferred. Four ounces of a 0.05 per cent solution of tyrothricin is mixed with 28 oz. of the glycerin-saline base. This quart of irrigating solution contains approximately 6 mg. of tyrothricin.

The enzyme used is pancreatic dornase,[5] which liquifies pus by a catalytic action on the nucleoproteins. It is a useful agent in treating conditions such as sinusitis. We have used it since January, 1953, in treating the purulent and mucopurulent types. As the liquifying action (the result of the enzyme) progresses, tyrothricin solution is used in addition. We use the enzyme at the rate of 100,000 units to 4 oz. of normal saline. The resulting solution is prepared just prior to its use and is sufficient for the treatment of 1 horse. Kral[6] reports excellent results using pancreatic dornase in treating affected sinuses through a small trephine opening in the maxillary sinus.

RESULTS

A total of 82 horses (table 1) were treated with nasal irrigations in 1954 and 1955 and perhaps 300 horses in the last eight

years. Ill-effects, following this type of treatment, have been noticed in only 3 horses. Symptoms observed in these animals were slight fever, lassitude, and loss of appetite. There appeared to be no increase in the amount of nasal discharge. All 3 were back on feed and their temperatures had returned to normal in approximately 24 hours. It is our opinion that the irrigations were a factor in changing a chronic inflammation into a subacute one. We have never recommended nasal irrigations in treating acute or subacute nasal catarrh and sinusitis for fear of scattering an infection that should be localizing.

TABLE I—Horses Treated with Nasal Irrigations in 1954 and 1955

Condition	Treatment	No. of horses	No. of treatments
Purulent sinusitis	Pancreatic dornase	10	33
Catarrhal sinusitis	Tyrothricin in glycerin-saline solution	72	152
Totals		82	185

Otherwise, the results were good following nasal irrigations. It should be stated that ownership of Thoroughbreds may change several times in one season if they are entered in claiming races. As a result, many of the horses treated are moved to other racing areas and further history of the case is not available. Surgical invasion of the sinuses has not been necessary in any of the animals which have continued to race in this area. A large percentage of the trainers are pleased with the results of the treatments because of the rapid improvement. Trainers are generally pleased, also, by the cooperation shown by the horse while receiving the treatments; in fact, some patients give the impression that they like the nasal irrigations.

DISCUSSION

It is my opinion that the glycerin in the irrigating solution contributes to the immediate improvement shown following treatment of a catarrhal sinusitis. Within 48 to 72 hours, the nasal orifice appears clean and dry. This is probably the result of the hygroscopic action of the glycerin. In addition, there is the possibility of a shrinking action on the surface of the mucosa in the nasal passages. However, in spite of the temporary improvement, the majority of these horses require further treatment.

Whether any of the irrigating solution reaches the cavity of the maxillary sinus through the nasomaxillary opening is doubtful. We are sure, nevertheless, that nasal irrigations stimulate sinus drainage. On a few occasions, we have treated horses which had a history of choking during a workout or a race, although nasal drainage had not been observed by the trainer or groom. While treating these animals, one or more clear mucous plugs would often roll or slide from the nasal orifice. It is my impression that these mucous masses came from the maxillary sinuses, since they were not tenacious and were unattached in the nasal passages.

CONCLUSIONS

A method of nasal irrigation for the treatment of nasal catarrh and sinus infections has been described. Approximately 300 horses were treated in eight years with slight, temporary ill-effects in 3 cases.

A differential diagnosis is necessary to eliminate, from this type of treatment, those animals suffering from guttural pouch infections, abscesses in the pharyngeal and laryngeal regions, and alveolar periostitis. This method of treatment is not recommended in acute sinusitis. Most of the animals treated had previously failed to respond to antibiotic or other therapy.

Surgical treatment is believed not to have been necessary in any of the animals treated by this method.

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Surgical Removal of Fracture Fragments of the Proximal Sesamoid Bone

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Fractures of the sesamoid bone are not common in Standardbred horses but, apparently, occur more frequently in Thoroughbred horses. They always cause concern because of their frequent, unfavorable termination.

The surgical technique to be described is not, unfortunately, a solution to the problem of fractured sesamoid bones. It is merely one method of treatment which has limitations and which can be applied to only a relatively small percentage of cases. However, with greater use of the technique, it undoubtedly will be improved.

ETIOLOGY

The cause of fractures of the sesamoid bone is probably not a constant factor. It is reasonable to assume that muscular fatigue at the end of a race can cause a horse to rely on basic skeletal structure for support rather than upon muscular elasticity. This would subject the suspensory ligament to more than its normal share of support and thereby increase the strain on the sesamoid bones. This theory would be more applicable to the Thoroughbred than the Standardbred horse.

Trauma may be a factor in the Standardbred. Several cases have been observed where "cross firing" at high speed was the apparent cause of fracture. A number of sesamoid bone fractures in the Standardbred have occurred while the horse was traveling relatively slowly, as in a workout or a warm up in preparation for a race. Such cases are difficult to explain.

PATHOLOGY

The anatomical peculiarities of the sesamoid bone seem to be a factor when a fracture occurs. The blood supply to the sesamoid bone is limited. The bone itself has a limited periosteal covering and no marrow cavity. Therefore, when fractured, the sesamoid bone has no true periosteal or endosteal bone regeneration such as occurs in a long bone. Another difficulty is the postfracture contraction of the suspensory ligament, or the inferior sesamoidean ligaments, or both, which tend to separate the fracture fragments. A weak fibrous union of the fracture fragments or chronic sesamoiditis are frequently the end result.

SURGICAL TREATMENT

Indications for Surgery.—In order to be a good surgical risk, the fracture of the sesamoid bone must involve the apex (proximal portion) of the bone. This is the only site which lends itself well to surgical approach. The proximal fragment should not consist of more than one third of the total volume of the bone. The smaller the proximal fragment, the better the prognosis, since this correspondingly lessens the area from which the suspensory ligament must be detached. The operation should be performed within two or three weeks of the time of fracture, before a fibrous union develops and before a sesamoiditis is initiated.

Preparation of the Patient.—Twenty-four hours prior to the operation, the lateral or medial surface of the leg adjacent to the involved sesamoid bone is clipped and shaved from a point midway between the knee and fetlock to the middle of the pastern. A wet pack of a 1:5,000 dilution of bichloride of mercury should then be applied and allowed to remain until the operation. In preparation for the general anesthesia, the horse should be fed sparingly, but water need not be withheld.

Anesthesia.—A general anesthetic is preferred for this procedure because of the necessary asepsis and because of the manipulations of the leg that are necessary during surgery. Either chloral hydrate alone or chloral hydrate in combination with magnesium sulfate and sodium pentobarbital will suffice for this procedure.

Surgical Procedure.—After the horse is anesthetized, its legs are arranged for the convenience of the operator, the wet pack is removed from the affected leg, and the surgical area is thoroughly prepared with ether, iodine, and alcohol. A thorough aseptic technique must be rigidly followed.

The initial, longitudinal incision is made through the skin midway between the sus-

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pensory ligament and the large metatarsal or metacarpal bone. The incision should be about 2 inches in length and should extend distally to a point ½ inch or so distal to the apex of the sesamoid bone. When surgery follows a recent fracture, this area of incision is usually distended somewhat by fluid tension within the joint capsule. The skin is then reflected for a sufficient distance so that sutures may be placed later without difficulty.

The subcutaneous tissue, light fascia, and joint capsule are then incised longitudinally, parallel to the original incision. Care should be taken to avoid incising the venous plexus which occupies the area directly posterior to the bone. The blade of the scalpel should be inclined toward the suspensory ligament when the incision is made.

Joint fluid will escape through the incision. The index finger is inserted into the joint and the anterior surface of the sesamoid bone palpated. This is facilitated by having an assistant flex the fetlock joint. In a recent fracture, the fracture line and the fracture fragment, which in most cases is still firmly attached to the suspensory ligament, can be readily detected by palpation. Using blunt-pointed scissors or the blunt end of a scalpel handle, the fragment is gently pried away from the balance of the sesamoid bone. The fragment is then grasped with a large pair of forceps or a rongeur and, by means of a continual rotating motion, is torn away from the insertion of the suspensory ligament. The cutting edge of an instrument is never used within the joint.

The joint capsule, fascia, and subcutaneous tissue are closed as a single layer of tissue, using interrupted catgut sutures (No. 1 medium chromic) placed about ⅛ inch apart. Precise apposition must be obtained. The skin may then be closed with interrupted sutures of stainless steel wire or nylon.

A vaseline dressing makes a suitable covering for the incision. This should be bandaged into place under three or four sheets of cotton. The bandage should be set rather snugly.

Postoperative Care.—Immediately following surgery, terramycin® (2.5 Gm.) and aqueous penicillin (3,000,000 units) are administered. This medication is repeated daily for six days, except that the terramycin is reduced to 1.0 Gm. daily after the second day. Other antibiotics would probably be just as effective. The surgical wound should be inspected and dressed daily. In 1 case, the joint became infected and it was necessary to give daily injections of penicillin and streptomycin directly into the joint.

About the third day following surgery, the horse should be able to bear weight on the leg and walk reasonably well. It is then recommended that the horse be walked twice daily for increasing periods of time. I believe this helps to prevent any adhesions that otherwise might develop within the joint.

The skin sutures should be removed in eight to ten days.

The horse should then be rested for about three months. At least this much time is probably necessary for the sesamoid bone and the suspensory ligament to heal. After the second month of rest, blisters applied to the fetlock area may be of some benefit.

STATISTICS

As of this date, I have operated on 23 horses for removal of a fracture fragment of the proximal sesamoid bone. Of the 23 horses, 11 resumed racing; 6 of the 11 were completely sound, while the other 5 would "sore up" after each race, as a result of chronic sesamoiditis. The remaining 6 of the 23 are either insufficiently tested or unreported. It is noteworthy that only 7 of the 23 were surgically treated within 30 days of the time of fracture. Of the 7 horses, 1 became infected at the time of surgery and was not returned to training; the remaining 6 were the horses which became completely sound.

SUMMARY

Surgical removal of fracture fragments of the proximal sesamoid bone is a successful and practical procedure. For best results:

1) The fracture should be recent (within 30 days; preferably 21 days).

2) The fracture should involve the apex of the sesamoid bone.

3) The fracture fragment should consist of no more than one third of the total volume of the sesamoid bone.

Local Anesthesia and Applied Anatomy as Related to Nerve Blocks in Horses

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Adequate anesthesia is a prerequisite for successful veterinary surgery. Anesthesia may be brought about (accomplished) in several ways. One can choose a drug which will affect the central nervous system, particularly the brain, e.g., chloroform, chloral hydrate, or pentobarbital sodium. One can choose a drug which acts at the neuromuscular junction of the efferent arm (motor impulses), e.g., curare or succinylcholine, or a drug which affects the afferent arm (sensory impulses of the reflex arc) can also be used. In this case, we are concerned with pain fibers or afferent impulses going to the spinal cord. I will confine my remarks to the latter method which is exemplified by the drugs which we classify as local anesthetics.

Regional anesthesia can be accomplished by either infiltrating the operative field with injections of an anesthetic or by injecting the solution on or near the nerve. This method requires a thorough knowledge of the applied anatomy involved. From a practitioner's point of view, it is preferable to do as much surgery under sedation and local nerve block or infiltration as possible. General anesthesia, in horses in particular, is not without danger to all concerned. Then too, surgery should not depend upon an operating table.

DEVELOPMENT OF LOCAL ANESTHESIA

Cocaine was introduced in 1884 by the Viennese physicians Karl Koller and Sigmund Freud; procaine by Einhorn and Braun in 1905; nupercaine by Miescher of Switzerland in 1925; metycaine by McElvain, Wisconsin, in the early 1930's; pontocaine by Eisleb of Germany in 1933; and continuous spinal anesthesia was introduced in the late 1930's. Since the turn of the century, approximately 2,000 local anesthetics have been introduced. One of the most significant, xylocaine,* was offered to the medical and dental professions in the late 1940's by the Swedish worker, Lofgren.[1]

Recent articles[2-5] indicate that xylocaine and cyclaine† are promising local anesthetics. Many of these reports in the medical literature are from Johns Hopkins University where, since 1950, xylocaine has been used as a local anesthetic in dentistry, urology, obstetrics, local nerve blocks, caudal anesthesia, and spinal anesthesia. Extensive research has also been conducted in the U.S. Marine Hospital, Baltimore, Md.; at Tufts Medical School in Boston; and recently by workers in England.[6] In a report in 1952,[7] veterinarians reported the use of xylocaine for dehorning, ovariectomy (bovine), digital amputation (bovine), dystocia (bovine), entropion (canine), and abdominal wounds (feline). In October, 1955, Myers and Deal,[8] general practitioners in Wisconsin, enthusiastically endorsed xylocaine for bovine practice. However, there is little published information in the literature on the use of this drug in the horse.

CLINICAL APPLICATIONS

Since 1951, a course in applied veterinary anatomy has been given the senior students at Iowa State College where not only applied anatomy and surgical anatomy are emphasized in the lecture room but, in addition, live animals are used in the laboratory sections. The veterinary students are expected to perform, on live animals, the various nerve blocks and other related anatomical and surgical procedures that are stressed in the lecture room.

Some preliminary observations on the use of cyclaine and xylocaine in this applied anatomy course during the fall quarter of 1955 are reported. The following specific nerve block exercises, using cyclaine, were performed: pudendal nerve block in the bull and stallion, using 20 cc. of cyclaine (5%) on each side; mandibular and maxillary nerve block in the horse, using 20 cc. of cyclaine (1%); infraorbital and mandibular nerve block in the dog, using 5 cc. of cyclaine (1%); epidural anesthesia in the horse and cow, using 10 to

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The authors express appreciation to Mr. Robert R. Billiar, medical artist, for preparing figures 1 and 2; to Mr. William J. Means for helpful aid in the original dissections; to Fort Dodge Laboratories, Inc., for complimentary xylocaine; and to Sharp and Dohme for complimentary cyclaine.

*Xylocaine (Fort Dodge) is the registered trademark for lidocaine hydrochloride.

†Cyclaine (Merck) is the registered trademark for hexylcaine hydrochloride.

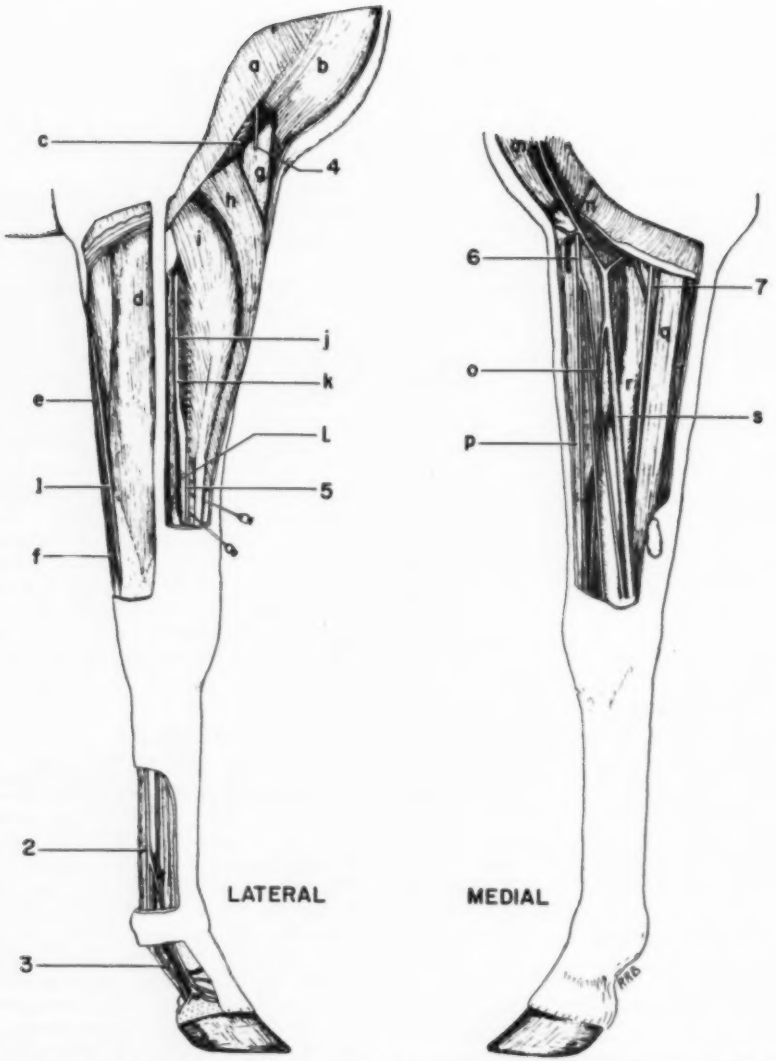

Fig. 1—Thoracic limb of horse: (1) ulnar n., site for nerve block; (2) lateral metacarpal n., site for nerve block; (3) volar digital n., site for nerve block; (4) cutaneous branch of radial n.; (5) radial n., site for nerve block; (6) cutaneous branch of median n., site for nerve block; (7) median n., site for nerve block; (a) m. cutaneous omobrachialis; (b) m. brachiocephalicus; (c) m. triceps brachii, lateral head; (d) m. ulnaris lateralis; (e) ulnar a.; (f) m. flexor carpi ulnaris; (g) m. brachialis; (h) m. extensor carpi radialis; (i) m. common digital extensor; (j) m. lateral digital extensor; (k) radius; (l) m. extensor carpi obliquus; (m) m. brachiocephalicus; (n) m. posterior superficial pectoral; (o) accessory cephalic v.; (p) m. extensor carpi radialis; (q) m. flexor carpi radialis; (r) radius; (s) cephalic v.

15 cc. cyclaine (1%); epidural anesthesia in the dog (25 lb. or less), using 3 to 5 cc. of cyclaine (1%); epidural in the dog (large), using 5 to 10 cc. of cyclaine (1%); epidural in the hog, using 5 to 10 cc. of cyclaine (1%) for every 100 lb.; and digital nerve blocks in cattle and horses, using 5 to 10 cc. of cyclaine (1%) for each digital nerve. We also had the opportunity to use xylocaine on a limited number of horses for blocking the various nerves to the appendages and, to date, we are impressed with the satisfactory results. Results have varied in the student laboratory sections but this may be accounted for in several ways, since different students perform the same block on different days, so the technique varies.

APPLIED ANATOMY

The applied anatomy of the horse involved in the various nerve blocks to the appendages can best be reviewed by an examination of an illustration of the lateral and medial view of the thoracic limb of the horse (fig. 1).

Complete anesthesia of the carpus and digits can be obtained by blocking the ulnar, radial, and median nerves and the cutaneous branches of the median nerve. The ulnar nerve (1)* can be blocked 6 inches above the accessory carpal bone as it lies superficially beneath the skin between the ulnaris lateralis muscle (d) and the flexor carpi ulnaris muscle (f). It has been found that it is necessary to block the radial nerve (5) also, if one wishes to obtain good anesthesia over the dorsolateral surface of the carpus. The radial nerve courses deeply on the surface of the radial bone in the area of the carpus and can best be anesthetized by placing the needle between the lateral digital extensor (j) and the common digital extensor (i), or between the extensor carpi radialis (h) and the common digital extensor (i).

The nerves on the medial side of the forearm can best be blocked by using the following anatomical landmarks: the median nerve (7) can be blocked about a hand's breadth below the posterior superficial pectoral muscle (n) as it lies on the medial surface of the radius (r) bounded, caudally, by the flexor carpi radialis muscle (q). Good results have consistently been obtained by first palpating the edge of the fused anterior and posterior superficial pectoral muscle (n) on the medial side of the forearm and inserting the needle through the edge of the posterior superficial pectoral muscle. In order to anesthetize the dorsal medial surface of the carpus, it has been found necessary to block the cutaneous branches of the median nerve (6), as it lies on the surface of the extensor carpi radialis muscle (p). These nerves lie beneath the skin and fascia and can best be located by palpating the cephalic vein (s) and accessory cephalic vein (o) for ori-

*Figures and letters within parentheses refer to designations in figure 1.

TABLE 1—Xylocaine, 2 per Cent, with and Without Epinephrine, Used at All Nerve Sites Except in Case 3

Horse No. and type	Dosage used	Time anesthetic given	Time anesthesia complete	Duration of anesthesia	Results
THORACIC LIMB					
1) Grade	10 cc., 2%	7:02	7:10	1 hr., 20 min.	Good
2) Grade	5 cc., 2%	7:30	—	—	None
3) Draft	7 cc., 3% (procaine)	8:00	—	—	None
4) Draft	5 cc., 2%	8:12	—	—	None
5) Saddle	10 cc., 2%	1:55	2:00	45 min.	Good, fired for ringbone and proximal sesamoiditis
6) Saddle	5 cc., 2%	7:05	7:15	1 hr., 45 min.	Good
7) Shetland	5 cc., 2%	7:20	—	—	None
8) Saddle	10 cc., 2%	7:52	8:04	1 hr., 1 min.	Good
9) Saddle	10 cc., 2%	8:35	8:45	1 hr.	Good
10) Palomino	10 cc., 2%	3:30	3:50	40 min.	Good, fired for ringbone
11) Standardbred	10 cc., 2%	10:00	10:15	1 hr., 15 min.	Good, fired for proximal sesamoiditis
PELVIC LIMB					
12) Thoroughbred	10 cc., 2%	9:55	10:10	1 hr., 40 min.	Good, plantar neurectomy
13) Grade	10 cc., 2%	3:00	3:15	55 min.	Good
14) Standardbred	10 cc., 2%	4:00	4:10	1 hr.	Good
15) Standardbred	10 cc., 2%	10:00	10:15	30 min.	Good

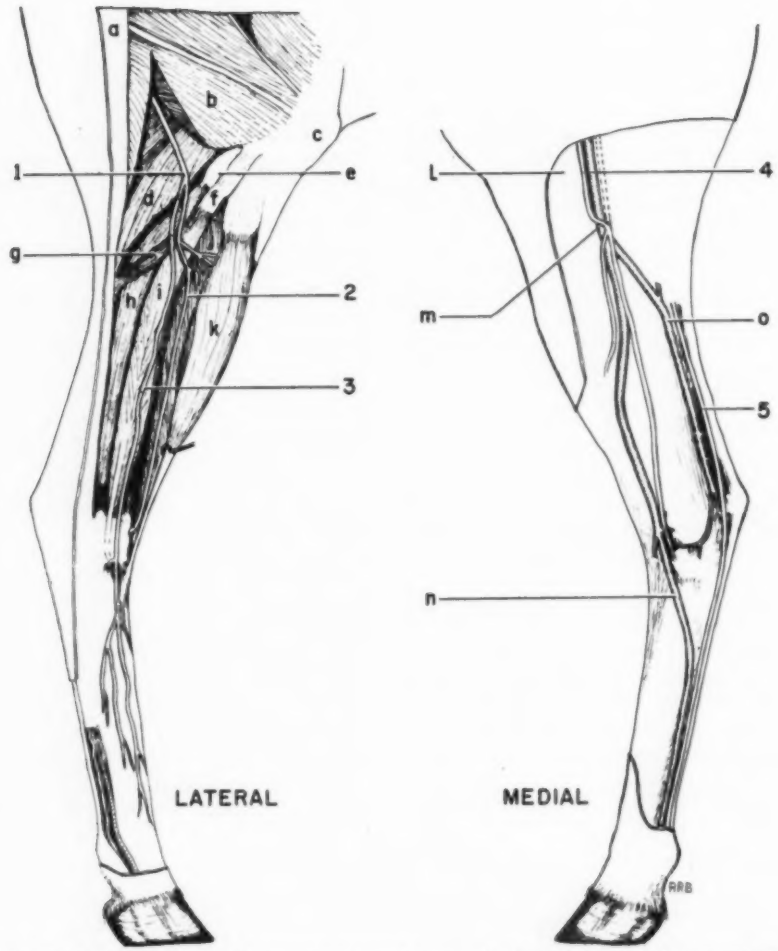

Fig. 2—Pelvic limb of horse: (1) common peroneal n., site for nerve block; (2) deep peroneal n.; (3) superficial peroneal n.; (4) saphenous n., site for nerve block; (5) tibial n., site for nerve block (a) fascia lata; (b) m. biceps femoris; (c) patella; (d) m. gastrocnemius; (e) lateral condyle of tibia; (f) tendon of origin of m. lateral digital extensor; (g) m. soleus; (h) m. deep digital flexor; (i) m. lateral digital extensor; (j) m. tibialis anterior; (k) m. long digital extensor; (l) medial condyle of tibia; (m) saphenous v.; (n) great metatarsal v.; (o) recurrent tibial v.

entation. Because of the variable termination of the accessory cephalic vein, it is usually necessary to place a portion of the anesthetic both in front and behind the palpable veins in order to completely anesthetize the nerves. However, if the accessory cephalic joins the cephalic in the proximal one third of the forearm as is shown (fig. 1), one injection at the site marked by the guideline 6 will suffice. At this point, the large cutaneous branch of the median nerve lies just anterior to the median cubital vein which passes upward and backward over the medial insertion of the biceps muscle to join the brachial vein.

Examination of an illustration of both a

lateral and medial view of the pelvic limb (fig. 2) reveals that, by blocking the common peroneal nerve (1), the saphenous nerve (4), and the tibial nerve (5), complete anesthesia of the tarsus and digits can be obtained. As the common peroneal emerges from beneath the lateral edge of the biceps femoralis muscle (b), it bifurcates into a deep branch (2) and a superficial branch (3). This bifurcation occurs as the nerve lies superficially on the lateral head of the gastrocnemius muscle (d) covered by skin and fascia lata (a). One can palpate the lateral condyle (e) of the tibia and insert the needle 1 to 1½ inches caudal to this anatomical bony landmark and, thus, block the common peroneal nerve (1) before its bifurcation. The extent of the superficial branches of the common peroneal nerve should also be noted in the area of the fetlock (fig. 2). These nerves are also blocked when the common peroneal nerve is properly anesthetized.

In order to obtain complete anesthesia on the medial surface of the leg, hock, and digits, it is necessary to anesthetize the saphenous nerve (4) and the tibial nerve (5). The saphenous nerve accompanies the saphenous vein (m), the latter being palpable on the medial side of the thigh. Because of the variable branch of the saphenous nerve which parallels the caudal border of the saphenous vein, in addition to the more constant branch (4) which parallels the cranial border of the saphenous vein, it is necessary to place the anesthetic both in front and behind the vein. The needle is inserted at the level of the medial condyle (L) of the tibia and the anesthetic is placed on either side of the saphenous vein at this site. Both the common peroneal and the saphenous nerve are superficially located beneath the skin and fascia at the site of the nerve blocks.

The tibial nerve (5) is anesthetized approximately 6 inches above the tuber calcis as it lies between the tendon of Achilles caudally and the deep digital flexor tendon cranially.

Observation of limited clinical cases revealed that if approximately 10 cc. of a 2 per cent xylocaine solution is placed at each of the sites enumerated, good anesthesia will ensue. In other words, 50 cc. of solution is necessary to completely anesthetize both the medial and lateral portion of the thoracic limb and a total of 30 cc. for complete anesthesia of the pelvic limb. Good anesthesia was obtained ten to 15 minutes following injection of 10 cc. of 2 per cent xylocaine solution (table 1). Duration of anesthesia was one hour or longer in all cases where this dosage was used. However, if the dosage was lowered, only partial or no anesthesia resulted.

Many other nerve blocks can be performed in the horse. The pudendal nerve block developed for the bull can also be performed in the stallion. The technique that has been used in applied anatomy at Iowa State College since 1951 is similar in both the bull and the stallion, namely, that the needle and anesthetic are placed approximately 1 inch ventral to the anus and ¾ to 1 inch lateral from the midline as the nerve courses caudally around the ischial arch. It is usually necessary to insert the 2-inch, 18-gauge needle up to the hub for proper anesthesia.

CONCLUSION

In conclusion, the limited observations on the use of cyclaine and xylocaine on animals seem to confirm the favorable reports in the literature pertaining to man.

In addition, we have presented for the first time, to the best of our knowledge, a new and successful anatomical approach to blocking the common peroneal nerve and the saphenous nerve in the horse.

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Objective Examinations in Veterinary Medicine

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I WANT to express my appreciation to you for the opportunity of appearing before you today.

Within the next several months (or in the case of junior students, a year from this spring), you will be taking examinations, administered by state boards of veterinary medicine, in order to be licensed to practice veterinary medicine. In some states, you will be writing essay-type or discussion-type examinations. In approximately one fourth of the states, those of you taking these examinations will be answering objective examination questions.

The states offering objective examinations will very likely be using those prepared jointly by the National Board of Veterinary Medical Examiners and the Professional Examination Service. At a meeting last fall, the Examination Committee of the National Board of Veterinary Medical Examiners thought it would be appropriate to tell veterinary students something about the history and present status of the objective examinations which we make available to state boards. Consequently, I have the pleasure of talking to you and to students in other veterinary schools about objective examinations.

Nature and Purpose of Objective Testing

I would like to tell you of the nature and purpose of objective testing, its use at the professional level, the reasons why the Professional Examination Service is concerned with examinations in veterinary medicine and in other health professions, the methods and techniques employed in developing objective examinations and, finally, the status of their use in the veterinary field.

The Professional Examination Service came into being as a result of an amendment to the Social Security Act in 1939, which required that state health departments, in order to qualify for federal funds, operate their personnel administration on the basis of merit. This included the use of written examinations in the selection of employees. In 1941, at the urgent request of federal health officials, the American Public Health Association accepted the responsibility of developing objective examinations for this purpose. The American Public Health Association is a nongovernmental, nonprofit membership organization open to anyone interested in public health. The Professional Examination Service of the American Public Health Association is the unit which develops the examinations. Its director is Dr. Lillian D. Long, whom some of you may have heard in Minneapolis last August, and I am its consultant in personnel administration and its representative in the field.

In 1952, the National Board of Veterinary Medical Examiners sought advice from the Professional Examination Service regarding objective examinations in veterinary medicine. Shortly thereafter, under the auspices of the Board's Examination Committee, the development of objective examinations in veterinary medicine was begun. By 1954, the examinations were ready for use and three state veterinary boards tried them out. In 1955, five more boards adopted the examinations in place of their essay examination and, so far in 1956, 11 U.S. boards are planning on using the services provided by the Board and the Professional Examination Service.[1]

The Professional Examination Service tried out many types of objective examination techniques and finally decided that the multiple-choice type, in which there is a premise or opening statement, which sets the problem, followed by one correct choice and four wrong choices, was most adaptable at high professional levels.

Since 1943, examinations in about 25 professional fields have been developed for positions ranging from the lowest subprofessional level to the highest administrative level. This is carried on under the joint auspices and efforts of persons highly trained and experienced in their fields and well-qualified psychologists who specialize in the branch of psychometrics. To illus-

Manuscript of talk presented to students in the various veterinary schools in the spring of 1956.

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trate in the field of veterinary medicine, Dr. Alexander Zeissig, formerly on the veterinary faculty at Cornell, later with the New York State Department of Health, and now in charge of veterinary activities at Merck and Co., Inc., was selected to guide the development of examinations in veterinary medicine.

DEVELOPMENT OF OBJECTIVE TEST IN VETERINARY MEDICINE

Dr. Zeissig's first task was to learn the principles of testing (this was not difficult for he had already experimented with objective tests with his students at Cornell). His next task was to develop an outline of subject-matter content in the field of veterinary medicine, to develop lists of potential writers of multiple-choice questions who would be widely scattered both geographically and ideologically, and to prepare a similar list of the country's recognized experts who would become reviewers of the questions.

Examination questions or items, as they are called, are then requested by mail or in person. Explicit directions for writing the items are provided the writers and, routinely, several thousand questions come in yearly.

The questions are identified, evaluated, and classified. They are then reviewed and revised jointly by a test expert, a psychometrician, and by Dr. Zeissig. Quite often, this first revision is extensive in order that the principles of test-item development may be observed. When these persons are satisfied with the question and it has been edited, about 50 questions in a specified, small area of the subject are assembled into review booklets which are sent to a panel ranging from three to six experts in the area of knowledge. The reviewer answers the questions, suggests modifications or changes, predicts their suitability and difficulty, and returns them with his comments. When they are returned and all the reviewers' comments are assembled, Dr. Zeissig and the psychometrician on the staff, usually Dr. Long herself, review the comments and make indicated changes in the item. At this point, anywhere from ten to 15 people have worked on each item.

The next step in examination development is the selection of the questions for an examination. For an examination which is to be used in ranking candidates for selection for employment, the description of the position and the knowledge and abilities required are the guides. A detailed outline of subject-matter content is laid out and the questions to cover the outline are pulled from the files. These are printed and assembled and sent out for use.

For an examination which is to be used in licensing or for a board certification, such as is used by the American Board of Veterinary Public Health, an examination committee develops the outline and selects the questions for it.

In every case, examination development is a joint operation.

The third and, to me, the most important and fascinating step in examination development is in validating the test. Here, we want to make sure that the examination is measuring what it is supposed to measure and that each individual item is performing its function.

One of the steps in validation is in matching the candidate's examination scores with his standing in college. We are getting very satisfactory results with these studies and you might say, in effect, that we are reaching approximately the same judgments about students which college faculties reach in four years of intimate educational contact.

Another step in validation is in what is called item analysis. Here the candidates' papers are sorted by scores into the upper third and the lower third. The numbers of times candidates selected each of the five choices in every question are recorded and the discriminative value of the question computed. These data are given to the consultant or to the examination committee as a guide to the revision of the test. Each question must meet certain criteria, *viz.*: It should not be too difficult nor too easy; it should be answered correctly more often by those in the upper third than by those in the lower third; and each wrong choice must be attractive to some candidates, preferably in the lower third.

I am sure you are saying that this is an expensive process. It is. Each question costs about $10.00 to develop and this is low, because techniques have been adopted to keep the cost down. However, questions which meet the foregoing criteria can be used repeatedly until they become out of date.

Examinations are offered to state veterinary examining boards who administer the tests. They return the papers for scoring

and, upon receipt of the scores, determine the passing point. In this way, none of the board's prerogatives and responsibilities have been altered and they have the advantage of knowing that they have used a scientifically designed test.

ADVANTAGES AND DISADVANTAGES OF OBJECTIVE TESTING

Now, let us examine the advantages and the disadvantages of objective testing.

The fundamental purpose of objective testing is the accurate testing of people. It is well known, and can be shown experimentally, that the results of essay- or discussion-type questions are affected by the mood, the bias, the fatigue, and even the lack of knowledge of the person grading the paper. For instance, papers graded at night will have different grades from those which would have been given had they been read in the morning. There is a so-called "halo" effect in which a paper will have a higher score if the paper just preceding it had been good than it would have had if the paper preceding it had been poor. In other words, one paper's grade affects the next one read.

A recent experiment in the pharmacy field shows that two graders do not give the same grade. A list of questions was used in several states and graded by different persons in several states. The results showed that grades varied by as much as 50 points, with good papers receiving flunking grades and bad papers receiving high grades.

There is quite a body of experimentation in the literature reporting this unreliability of scoring essay tests.

The score of an objective test is the number of times a candidate has selected the correct answer. This is one of the primary advantages of objective testing. The final score reflects only the efforts of the candidate and not the mood, the bias, and the fatigue of the grader. It can be scored by machine, quickly and efficiently, and the grades can be reported rapidly—an important factor in licensing where a person is waiting for the results of a licensing test in order to begin his career.

For licensing boards, objective testing has the following advantages:

1) The boards are assured that the test questions are professionally sound and valid and that they are backed by the authority of co-workers in the field.

2) The method makes it possible for as many board members as may so desire to contribute to the preparation of the test.

3) The procedures for obtaining examination materials are greatly simplified.

4) The confidential nature of the examination under a controlled system of administration is assured.

5) The tests enable the examiners to sample a far wider range of knowledge and ability than could be covered by an essay test in a comparable period of time.

6) Objective scoring does away with the difficulties and uncertainties characteristic of the scoring of essay tests.

7) Objective scoring greatly reduces the interval between the administration of the test and the reporting of results.

8) The effectiveness of the test and the questions can be precisely evaluated by statistical procedures.

9) Because the increasingly successful use of this method has developed a favorable attitude toward it among examinees, they are likely to feel a confidence in it and a respect for it that is frequently lacking in their attitude toward essay tests. This tends to reduce protests and appeals. When protests are raised, however, they are the more readily answered because of the procedures used in developing these tests and because of the availability of statistical evidence with respect to the quality of the tests and questions.

For the candidates, the advantages are:

1) The extensive subject-matter coverage gives them a wider opportunity for displaying their knowledge and ability than is possible in an essay test.

2) Because of the mechanical ease of recording answers to objective questions, there is a reduction in the fatigue associated with writing long essay-type answers and in the accompanying falling off of the ability to concentrate.

3) There is a confidence in the test which stems from an awareness of the scientific procedures that have contributed to its development.

4) There is an assurance of complete impartiality and accuracy of scoring.

5) The speed with which results can be reported is greatly valued by candidates who wish to be licensed as quickly as possible, so that they may enter upon their vocational careers.

I am a strong proponent of objective tests, if they are scientifically designed. I believe they are the answer to problems of licensing, selecting, and certifying. However, I was asked to tell of the disadvantages of objective testing and I have had to search for one.

In so far as I know, there is only one disadvantage to objective testing. This dis-

advantage is true also of the essay-type examination. The disadvantage of which I speak is the security or the integrity of the examination.

We know that, traditionally, students have access to the essay examination questions which state boards have used in the past. And, referring to the efforts of some candidates last year, we know that the subject-matter content of many questions used in the 1955 objective examination have been recorded. You may even have a list of them. It is possible for candidates to memorize a few questions and, if this memorization is deliberate and planned, the contents of an examination can become public property.

There is no way known to prevent such leakage of examination questions, but there are many ways of knowing when such leakage has taken place. We just hope the advantages of objective testing in veterinary licensing will make you students anxious to make it work. Your wholehearted cooperation in avoiding the copying of questions is of utmost importance if the method is to remain available to you.

Dr. Long spoke of this problem at the meeting of the National Board in Minneapolis last year, and her remarks appear in print in Part 2 of the March 15, 1956, issue of the JOURNAL.[2] She said that:

> The examination of professional people puts a great responsibility upon examiners. This is a twofold responsibility: to the examinees who have invested so largely of their time, their money, and themselves in developing their professional competency and to those whom they serve.
>
> It should, therefore, be a test which merits the highest respect of those who give it, those who take it, and those who are affected by the results. An appraisal of the quality of written licensing tests in general in this country reveals serious deficiencies of which licensing boards themselves are keenly aware. Conscientious licensing boards struggle with the dead weight of an antiquated examining method. For the most part, boards have no access to assistance from test experts. In many cases, they have not had an opportunity to become informed of the ways in which test technicians might help them.

It is our conviction that the scientifically designed objective type of written test is the fairest and most accurate measuring instrument for the evaluation of professional knowledge and judgment. We believe that those who are responsible for measuring the competency of professional people should have every opportunity to become acquainted with the procedures and principles of objective testing and that, with such opportunity to appraise its value, they will inevitably turn to the method as one which will most accurately help them carry out their responsibilities.

The role of the Professional Examination Service is simply that we have some special skills in test construction and analysis which we believe can be of some use to professional people. It can be of use, however, only as an adjunct to the efforts of the profession.

> This type of cooperative effort has . . . . had no happier setting than in its relationship with the National Board of Veterinary Medical Examiners. All who have worked on this project have been motivated by a desire to provide to state licensing boards a service in that one area of the state boards' responsibility, namely the written test, in which help can be most effectively given and to provide this help in such a way that there will be no intrusion on the boards' unique responsibilities and prerogatives.
>
> In so complex an undertaking there are inevitable problems which arise. I am reminded of a philosophy professor who used to say that if all people were good and wise it would not matter what kind of government they had. It may also be said that if all people were good and wise it would not matter what kind of tests they were given, nor how they were given. Unfortunately, the not-so-good and the not-so-wise have a long tradition of trying to beat the licensing test. The methods are familiar to all of you. Overanxious candidates will not stop these ancient practices because there is a new type of test being used. In fact, at the start, it may even offer something of a challenge to them to increase their efforts. The question is whether the objective testing method is more vulnerable to attacks upon its integrity than is the essay method. I do not think so. The very size of the examinations—435 questions—is itself a protection. The possibilities of developing parallel forms of the test and the fact that the test will constantly be modified to improve and sharpen it—all of these characteristics will protect it.
>
> From a long-range point of view, however, it is my hope that the quality of the test itself and the sincerity of this whole testing program will be the forces which change the sporting attitude towards the written test that a minority of candidates have. The least that can be hoped for is that candidates will discover that strategy for "cracking" the test is uneconomical and ineffective. The better thing to hope for is that experience with objective tests will convince examinees of the great advantages to them of this testing program; that they will recognize the stake which they and their profession have in using the most reliable, the most valid, and the most scientific method available for assessing their professional competency.

With this, I throw out a challenge to the leaders of students of veterinary medicine and to candidates for veterinary licensure. If you are to benefit from scientifically designed examination methods for securing licenses to practice veterinary medicine, you must exert your every effort to stop the attempts of the few to break down the confidential nature of objective licensing examinations, and to preserve the integrity of objective licensing tests. I am confident that your professional honor and honesty will convince you of the necessity to give your wholehearted cooperation in this worthwhile effort.

References

[1]Bower, C. W., and Hardenbergh, J. G.: Whither "National Board" Examinations in Veterinary Licensure? J.A.V.M.A., *128*, (1956): 489-494.

[2]Long, Lillian D.: An Appraisal of Objective Testing. J.A.V.M.A., Part 2, *128*, (1956): 128-132.

Immunizing Mink Against Botulism

In 1955, 8,000 mink were vaccinated, subcutaneously in the hindleg, with *Clostridium botulinum*, type C, toxoid. Many were challenged by feeding the toxin at pelting time five months later. Of 205 fed 100 m.l.d. of toxin, 8 showed signs of botulism, but those treated with 400 units of antitoxin recovered. Of 15 fed 400 m.l.d. of toxin, all died. Of 15 mink, vaccinated 18 months earlier, fed 200 m.l.d. of toxin, 3 died. Ten unvaccinated mink became ill when fed 100 m.l.d. of toxin, but 8 recovered when given 400 units of antitoxin.—*A. E. Larsen, D.V.M., Am. Fur Breeder, April, 1956.*

Nasal Air Conditioning

In the nose of mammals there is typically an anterior air-conditioning part and a posterior olfactory region. Both of these areas are small in species which have feeble powers of scent and extensive in those with a keen scent. The air-conditioning portion, with its ciliary epithelium, warms and moistens the air, thus aiding with "entrapping olfactory molecules and depositing them on the olfactory mucosa" where the epithelium is thin and permeable. These regions are best developed in Carnivora where the relative areas are greater and the turbinates more complex.—*Brit. M. J., Feb. 18, 1956.*

It's Time to End Hog Cholera

In an editorial in *Prairie Farmer* (April 21, 1956), we are reminded that hog cholera has been eradicated in Canada and some European countries; that most of the garbage now fed to hogs is cooked; and that three southeastern states have laws preventing the use of virulent virus. It is then suggested that the campaign "should start in areas where there are few hogs and work toward the corn belt where the job will be more difficult. . . . Keeping the hogs within an area vaccinated with serum or killed viruses might well do the trick."

The *Brucella Abortus* Ring Test

Ring tests on samples of milk and cream from 1,710 herds showed that, after a 15-minute incubation followed by a one-minute centrifugation at 1,000 r.p.m., more positive reactions were detected than after 60 minutes of incubation alone.

The ring test was positive for 97.88 per cent of 236 herds considered infected on the basis of the blood test. A tetrazolium blue-stained antigen proved satisfactory.—*Canad. J. Comp. Med. and Vet. Sci., March, 1956.*

Brucellosis Ring Test Limitations

Occasionally, no brucellosis is found in a herd which has given a positive milk ring test. The positive ring test may have been due: (1) to a nonspecific reaction which may occur when an animal has diarrhea or intestinal inflammation, (2) to enzymes like lactase and reductase when certain cows have been milking for long periods, or (3) to a slight titer due to calfhood vaccination; or the records may have been confused.

There is often a period of a month or two between the ring test and the blood test during which time offending cows may have recovered, been sold, or died. The delicate ring test, like all other tests, is not infallible but has proved to be reliable. —*Ayrshire Dig., April 15, 1956.*

Trichinosis in Man in Pennsylvania.—Twenty-nine cases of trichinosis in man have been definitely diagnosed in three Pennsylvania counties and 9 cases in Philadelphia are being investigated.—*U.S. Pub. Health Serv., March 29, 1956.*

Parakeets in Veterinary Practice

G. A. EVANS, D.V.M.

Clarion, Iowa

NUMERICALLY, that variety of parakeet known as the budgerigar ranks either first or second as the most popular pet in the United States. However, as a source of income to the veterinarian, it does not hold a high place. This is understandable in the case of the veterinarian with a large country practice but should not apply to the practitioner depending chiefly on a pet practice. Because of the frequent lack of knowledge by veterinarians as to the feeding, breeding, and diseased or normal conditions of parakeets, the owners take their problems to the pet shop keeper.

In parakeet practice, the client may be either the owner of 1 or a few pets or he may be a breeder or aviary owner. The first is interested in the welfare of 1 particular bird, while the breeder is more concerned with flock problems.

MANAGEMENT

Housing.—These birds are being bred and raised successfully in almost every imaginable kind of building. Attics, rooms, and basements, as well as special separate buildings, have been used with good results. As with poultry, adequate fresh air, dryness, and room are essential. Flight enclosures at least 8 feet long and 6 feet high with perches at the two ends have been satisfactory. Parakeets can stand variable temperatures but about 65 F. seems most favorable. Outdoor flights in the summer are not a necessity but they aid in maintaining flock vigor.

Feeding.—Equal parts of canary seed and large white millet with the addition of 10 per cent of hulled oats of good quality are considered a standard ration. Seed with a high germination value should be used. A protein supplement similar to that used in poultry feeding may be given in addition. Grit is absolutely essential at all times. It may consist of fine sand with the addition of calcium, phosphorus, and 1 per cent salt. Addition of trace minerals is desirable. Greens should be fed daily. Celery tops, carrots and carrot tops, dandelion plants, seedling grasses, and lawn clippings produce excellent results. Care should be taken that greens are clean and have not been frosted. Fresh water should be available at all times.

Breeding.—Whether the owner has one or many pairs, a separate breeding cage for each pair is best. In colony breeding or when a number of pairs are in the same enclosure, there is always danger of a hen running amuck, killing other hens or their young.

It is advisable to permit only two hatchings a year from each pair since overbreeding results in weak, stunted young. Although these birds will breed in any season, it is best to stop breeding operations during the hot summer months. The nest boxes should be equipped with rounded wooden bottoms and attached to the outside of the breeding cage with a 2-inch entrance hole connecting them.

DISEASES

On the basis of the hundreds of letters, telegrams, and telephone calls which we have received, the following diseases or conditions would seem to be the most common ones brought to the veterinarian's attention.

French Molt.—French molt is one of the most common problems and, in all probability, is more discussed by breeders than any other. There are three unproved theories as to its cause, namely faulty nutrition, infection, and mites.

Visible evidence of this condition is seen only in young birds. It occurs while the fledglings are in the nest but often is not discovered until shortly after they leave the nest at the age of 4 to 6 weeks. Its effects seemingly show only in the improper development of the feathers.

There is a wide variation in the severity of the condition, the young sometimes developing practically no feathers. Most commonly, only the main tail and primary wing feathers are involved. They are either undersized or they develop normally but will start falling out about the time the bird leaves the nest. Sometimes only one or two of these feathers will be affected.

Dr. Evans was a general practitioner (retired) and is a breeder and exhibitor of budgerigars and official veterinarian of the American Budgerigar Society.

French molt is the cause of almost 100 per cent of the cases in which a bird is unable to fly or is dropping feathers. Even in the mild form, the quill of the main tail or primary wing feathers will be black and the feather is easily removed. Such birds usually develop normal feathers eventually if they are well cared for. It may help if the involved feathers are removed and the bird is sprayed with a 2 per cent quaternary ammonium solution.

Feather Picking.—Feather picking concerns only breeding birds when the young are in the nest. The young have bare areas on the back and head and, in more severe cases, may be covered with blood. If action is not taken promptly, these birds may be so badly mutilated that no feathers will develop or they may be killed. The hen, usually the offender, should be removed from the breeding cage. The cock will usually take over the feeding chores, although there are cases in which he fails. If the picking continues, the cock is at fault. In these cases, the young should be moved to another breeding pair if available. Daily use of a mentholated ointment on the back and heads of the young will at times dissuade the parents from picking.

In pet birds, an occasional individual will develop a habit of self-picking resulting in bare areas. A daily spraying with plain water and plenty of flying room will at times correct this.

Diarrhea.—Diarrhea is a symptom that appears in practically all cases of illness in parakeets, whether infectious or not. Their droppings are normally dry and chalky.

Noninfectious diarrhea is commonly caused by dietary faults, such as poor mixtures, inferior seed, bad greens, or bad or insufficient grit; also a lack of fresh water. It is most often seen in pet birds due to the fact that the bird is eating with the family and picking up a variety of food. Because of the demand, young birds are sometimes taken from their parents and sold before they can properly husk seeds. These birds usually show diarrhea, fluffed-up feathers, and loss of weight; they die within a few days. Soaking the seeds makes them easier to husk and with a plentiful supply of soaked oats the bird often gets enough nourishment to survive.

The excitement of a strange place, new faces, and too much handling, as with puppies, will cause diarrhea in parakeets. In such cases, it is best to cover the cage and leave the bird alone until the droppings become normal. If medication is desired, 1 drop of a bismuth preparation twice a day often is of benefit.

Large aviaries may have heavy losses with diarrhea as the only symptom and Salmonella, Pasteurella and, in a few cases, coccidia have been isolated. A thorough cleaning of flight areas, perches, nest boxes, walls, floors, and drinking and feeding utensils is recommended as a control measure. A quarternary ammonium solution as a disinfectant and a sulfaquinoxaline solution in the drinking water, as in poultry, is also recommended. A cessation of symptoms within 48 hours after starting treatment is often reported.

Colds and Pneumonia.—These conditions are common in pet parakeets. They are indicated by a nasal discharge, rapid breathing, and usually by diarrhea. Usually, such birds have been kept in a warm room, then suddenly exposed to a cold draft. Recovery often follows if the bird is kept quiet in a room at 72 F. Tetracycline (1 mg.) in the drinking water or injected in an aqueous solution may be of value.

Psittacosis.—Psittacosis is, I believe, the only disease that is now recognized as being transmissible from psittacine birds to man. Periodically, this disease has been given much publicity. Some of the large outbreaks in man have been through contact with turkeys and other forms of poultry.

Clinical symptoms should never be relied upon for a diagnosis. Any bird or birds showing both a nasal discharge and diarrhea should be considered suspicious. This is especially true if a person, or persons, in contact with the birds has a virus-like pulmonary condition. A diagnosis can not be positive unless based on a laboratory examination.

Meyer[1] has shown that the daily injection of 1 to 2 mg. of an aqueous tetracycline solution into the pectoral muscles for 15 days, along with proper isolation, will produce negative tests in infected aviaries and keep them negative for a period of time.

An attempt is being made to produce the same results with a food impregnated with a tetracycline. If this method proves feasible, whole breeding establishments and all

[1]Meyer, K. F.: Problems in the Control of Psittacosis and Ornithosis. Proc. Book, AVMA (1955): 412-419.

pet birds could be treated, under isolation, before being offered to the public. If this method is successful, the disease can be practically eliminated.

Parasites.—Except for the red mite, parasites are not commonly found. This mite can be readily seen on the end of perches or in the breeding boxes in the morning when, as in poultry, they will be found distended with blood. Lindane solution on the perches and under the nest boxes will eliminate the mites but care must be exercised that it does not come in contact with food or water. A spray of 10 per cent kerosene in a light mineral oil has produced excellent results.

Tumors.—Old birds often have lumps of fat on their breasts, which may be mistaken for tumors. These lumps are bilateral; a tumor is unilateral. Breast tumors usually are easily removed. Tumors of the abdominal cavity may be indicated by a continuous flicking of the tail over a long period of time.

Infected Eyes—Another condition, infected eyes, is common. Keeping the bird in a dark room and administering an ophthalmic or antibiotic ointment will often correct this trouble.

Overgrown Toenails and Beaks.—Trimming of toenails and beaks requires attention. Overgrown toenails should be held before a light and cut beyond the extent of the blood vessels which can be readily seen. An overgrown beak, as often develops in pet parakeets, will prevent the husking of seeds. It should be trimmed as nearly as possible to normal length.

Except for the work of Meyer, little research has been reported on the diseases of parakeets. It is hoped that work on nutrition in England, Canada, and the United States may result in further knowledge, especially as regards French molt.

Parakeets and Where They Came from

Over 100 years ago, an English ornithologist wrote about the migratory flocks of green, parrot-like birds he had seen in the grasslands of Australia. English sailors soon were taking them, instead of the traditional parrots, to their homes. Parakeet popularity has developed into a multimillion-dollar business, with an increase in their population in this country of 161 per cent in the last two years.

Their original name, "budgereegahs," has since been corrupted to budgerigar or "budgie." They are not "lovebirds." The true lovebird is a chunky little parrot with a shorter, square tail, and is found in Africa and South America.—*Pet Shop, Feb., 1956.*

Tetanus Toxoid Antitoxin Levels

Recent tests on military personnel, who received two doses of precipitated tetanus toxoid one month apart and a third dose one year later, indicated they had good serum antitoxin levels up to six years after the last booster dose. Additional booster doses are recommended every four years and may restore immunity after ten years. In case of any uncertainty, the simultaneous administration of antitoxin with a toxoid is justified.—*J.Am.M.A., March 10, 1956.*

Virus Pneumonia in Lambs.—A suspension of lung material from lambs which had a disease resembling infectious pleuropneumonia of goats reproduced, after egg passages, the disease by nasal instillation. *Pasteurella oviseptica*, sometimes isolated from such lambs, is only a secondary contaminant.—*Vet. Bull., Feb., 1956.*

BHC Poisoning in Horses

Five ponies were affected with benzene hexachloride (BHC) poisoning, after eating contaminated bran, and 2 died. They showed tetanic spasms, sweating, dyspnea, violence and, in 3 cases, colic. Necropsy revealed diffuse areas of inflammation on the intestinal wall, fibrinous exudate between the stomach and diaphragm, blood-tinged pericardial fluid, petechiae in the myocardium and friability of the kidneys and liver.—*Vet. Bull., March, 1956.*

Promazine Hydrochloride.—A new tranquilizing drug, promazine hydrochloride, called sparine, manufactured by Wyeth Laboratories, is related chemically to chlorpromazine. It is a phenothiazine derivative and is not yet available for general use.—*Sci. News Letter, March 3, 1956.*

A New Method of Application of Pigeon Pox Vaccine

TEVIS M. GOLDHAFT, D.V.M.

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FOWLPOX was once considered one of the most important diseases affecting adult fowl. It was also the cause of serious financial loss to the commercial poultrymen during the 1920's and the early 1930's.[1] The causative agent is a virus that causes scabby lesions (dry pox) on the unfeathered parts of the skin and diphtheritic-like membranes in the mouth, larynx, and on the tongue (wet pox). When the flock is affected externally with fowlpox, mortality is low. Losses occur only among birds that are suffering from some concurrent poultry disease or on which scabs form on the eyelids. The birds, being unable to see to eat, become culls and die. In the mouth form of the disease, mortality can be high. Among nonfatally infected fowl, fowlpox seriously interferes with the normal rate of growth and temporarily halts egg production.

Attempts at live virus immunization were started as early as 1921[2] and commercial fowlpox vaccines prepared from the scabs of artifically infected birds have been available since 1928. Immunization with a live fowlpox vaccine has been in general use for many years with good results. It confers a durable immunity that persists throughout the average life of a fowl.

As early as 1912,[1] research workers reported the successful transmission of fowlpox from diseased to healthy fowl by mosquitoes. In 1929, it was proved that Culex and Aedes mosquitoes were capable of transmitting fowlpox infection.[3] It has been confirmed that both species transmit the infection and they retain this power for at least 39 days after feeding on an infected bird. Mosquitoes and other biting insects are the cause of the spread of this disease from farm to farm. However, fowlpox is a highly contagious disease, under both laboratory and field conditions, and can spread rapidly in a flock by direct contact transmission in the absence of an insect vector.[4]

There are two methods of immunization against fowlpox in use at this time[5-12]:

1) Fowlpox vaccine, consisting of the dried chorioallantoic membranes of embryonating eggs infected with fowlpox virus plus a suitable diluent, is applied to the birds with a stick-method applicator, usually in the web of the wing and, occasionally, through the skin of the leg on the thigh.

2) Pigeon pox vaccine, consisting of the dried chorioallantoic membranes of embryonating eggs infected with pigeon pox virus plus a suitable diluent, is applied to the birds with a brush to the feather follicles of the leg after the feathers have been removed.[13]

Reports[14-18] indicate that the best results in fowlpox vaccination were obtained in birds between 30 and 90 days of age, whereas vaccination between 90 and 120 days of age caused a temporary check in growth, and vaccination after 120 days caused a distinct pox-vaccination shock.

As cecal and intestinal coccidiosis are problems on most poultry farms in birds up to 12 weeks of age, most poultrymen producing laying bird replacements delay vaccination until the coccidiosis danger is over. The birds are then vaccinated with fowlpox vaccine when 12 to 20 weeks of age. In some areas of the United States, blackhead has become a problem in poultry flocks. When fowlpox vaccine is applied to birds infected with blackhead, there is considerable loss. When this occurs, most poultrymen use pigeon pox vaccine for their succeeding groups of laying bird replacements. Thus, in the central New Jersey area, pigeon pox vaccine is used almost exclusively.

Once fowlpox was conquered by vaccination, it was replaced in importance by a number of other diseases, some of which are still unconquered. In the past ten years, Newcastle disease, infectious bronchitis, and chronic respiratory disease have been the major causes of trouble for the commercial egg and broiler producers. With the much expanded broiler-raising industry, poultry susceptible to these three major respiratory diseases are present at all times and in all areas of the country. Vaccination to prevent Newcastle disease, and more recently infectious bronchitis,

Dr. Goldhaft is general manager of the Vineland Poultry Laboratories, Vineland, N.J.

has been practiced extensively. Most flocks are exposed to Newcastle disease and infectious bronchitis in their natural form or as a result of vaccination practices. In addition, many flocks are infected with chronic respiratory disease. Birds which have recovered from these diseases or other debilitating conditions are poor candidates for vaccination with fowlpox vaccine; therefore, there has been a greater interest in pigeon pox vaccine.

Broiler raisers in the southern states, from Florida to Texas, need some form of protection for their birds at an early age. Many have reported fowlpox in chicks when 10 to 14 days of age. Fowlpox vaccine has been used on day-old chicks but heavy mortality resulted when the chicks had unabsorbed yolks, epidemic tremors, or were infected with omphalitis or coccidiosis while the vaccine was having its effect.[19] Many of these poultrymen report that the use of fowlpox vaccine in day-old chicks results in retarded growth and unevenness in the flock.

REACTION ON BIRDS WHEN VACCINES ARE APPLIED

Fowlpox Vaccine.—When fowlpox vaccine is applied to a chicken by the stick method in the web of the wing or by the brush method in the feather follicles, a slight swelling takes place on the fifth to seventh day postvaccination. This is followed by a slight yellow exudate at the point of application and formation of a thin yellowish scab which turns brown within a day or two and black by the twelfth day. The scab remains at the point of vaccination until the twenty-first to twenty-fourth day postvaccination, at which time it drops off, leaving no evidence of the vaccination. When the scab is present, it is firmly attached.

When fowlpox vaccine is applied to pigeons, there is no visible skin reaction.

When fowlpox vaccine is used on a chicken, challenge with fowlpox virus will show the bird to be completely refractory 28 days after application.

Pigeon Pox Vaccine.—When pigeon pox vaccine is applied to chickens by the brush method on the exposed follicles of the leg, a few of the birds show a slight swelling of the follicles on the fifth day postvaccination. All birds show swellings on the sixth, seventh, and eighth days postvaccination. Swellings reach a peak on the ninth or tenth day, after which they recede and, in some birds, completely disappear by the fifteenth day. In some birds, the follicle swelling continues for an additional three or four days, after which new feathers grow out of the follicles.

TABLE 1—Reactions to the Application of High-Titer Pigeon Pox Vaccine to the Exposed Feather Follicles of Chickens

Bird No.	How applied	Total No. of swollen follicles on 7th day after application
2326	Brush, hard	16
2330	Brush, hard	25
2331	Brush, soft	12
2339	Brush, soft	15
2346	Spray	20
6 birds	Spray	25
2334	Spray, light	4

When small scabs develop, as they do occasionally, they seem to be skin healing in or on follicles which have swollen at least five times their normal size. When there is extreme swelling in an individual follicle, the skin will occasionally rupture, followed by formation of a small scab. This type of small scab is seen more frequently when pigeon pox vaccine is applied to baby chicks than when applied to growing or mature birds. Excessively hard brushing of the vaccine into the follicles will sometimes result in scabbing as a result of injury to the skin. Such scabbing usually disappears by the eighth day postvaccination. Ordinarily, true pigeon pox vaccine does not produce scabs when applied to chickens.

When pigeon pox vaccine is applied to pigeons, the follicles show swelling by the fifth or sixth day postvaccination, after which a yellowish scab develops which turns brown, then black, and begins to disappear in 21 to 24 days.

When chickens are vaccinated with pigeon pox vaccine, challenge with pigeon pox virus 21 to 28 days later will show the birds to be refractory.

However, chickens vaccinated with pigeon pox vaccine and then challenged with fowlpox virus show a fowlpox lesion seven to ten days after challenge. The type of fowlpox lesion developed is known as an abortive fowlpox lesion. The birds will develop a slight swelling and some scabs at the point of challenge but these scabs are not tightly adhered and usually brush off in 12 to 14 days postchallenge.

Some chickens vaccinated with pigeon

TABLE 2—Results of Various Methods of Application of Pigeon Pox Vaccine to 6-Week-Old White Leghorn Cockerels

Method of application	No. of birds			
	Inoculated	Immunized	Questionably immunized	Fully susceptible on challenge
In drinking water	7	0	2	5
Conjunctival instillation	4	0	0	4
To scarified comb	4	0	1	3
To various areas of scarified skin	10	1	1	8
In vent	4	0	0	4
Dipping legs below hock in vaccine suspension	2	0	0	2
Sprayed on feather follicles on breast	4	4	0	0
Sprayed on feather follicles on back of neck	4	4	0	0
Sprayed on feather follicles on back near tail	3	2	1	0
Sprayed on feather follicles on leg	10	10	0	0

pox vaccine and later exposed to a natural infection of fowlpox do develop some typical fowlpox lesions, particularly on the head and wattles. Such fowlpox lesions are usually of the abortive type and, even though they exist, the well-being of the birds and even their egg production are not affected.

When pigeon pox vaccine is applied to a chicken, the amount of immunity produced and its durability is, in general, related to the number of vaccinal lesions produced.

Past experience with pigeon pox vaccine indicates that the virus grows best and produces the best immunity when applied to the feather follicles which are lined with a layer of epithelial tissue known as stratum germinativum, the cells of which are active in the formation of quills and feathers. The application of pigeon pox vaccine to this epithelial layer resulted in a distinct swelling in that follicle within six days. The application of the same material to needle-punctured scarified skin in areas in which there were few feather follicles resulted in no evidence of swelling or subsequent immunity in the bird.

EXPERIMENTAL PROCEDURE

A simple test was set up to determine if spraying with a high-titer pigeon pox vaccine would produce takes. The following procedure was used:

A 500-dose package of pigeon pox vaccine,* containing 400 mg. of virus and 20 cc. of diluent, was mixed and placed in a clean, sterilized bottle of the type used for underarm deodorants. The mixed vaccine was sprayed on an area of the leg approximately 1 inch wide by 2 inches long, on each of 8 chickens, after the feathers had been removed. A light spray was used on 1 bird, while the other 7 were sprayed until the exposed skin had a dampened appearance. At the same time, the mixed vaccine was briskly brushed into the follicles of an equal area on the legs of 2 birds and applied gently with the brush to 2 other birds (table 1).

The takes produced in the above test prompted the trial of various methods of application of pigeon pox vaccine to 6-week-old White Leghorn cockerels (table 2).

To check the practicability of spray vaccinating with pigeon pox vaccine under field conditions, two commercial poultry flocks were vaccinated (table 3). Flock 1 consisted of 1,018 White Leghorns, 20 weeks old. Flock 2 consisted of 1,882 White Plymouth Rock meat birds, 10 weeks old.

Another series of tests, involving 2,004 birds, was set up to determine the ability of a pigeon pox vaccine (titer, 1:100,000) at various dosage levels to produce takes in susceptible birds when applied by the spray method. A dose of 0.3 cc. of the mixed vaccine containing from 0.5 to 4.0 mg. of vaccine per cubic centimeter was sprayed on approximately 25 exposed feather follicles on the thigh of each bird. Of the 2,004 birds sprayed, 25.99 per cent showed all exposed follicles swollen; 56.38 per cent showed 16 or more swollen follicles; 15.31

TABLE 3—Results of Spray Vaccinating with Pigeon Pox Vaccine of Chickens Under Field Conditions*

Flock No.	No. of birds	Examination for takes					
		Total No. examined	Neg.	1X	2X	3X	4X
1	1,018	255	0	0	12	69	174
2	1,882	1,617	2	14	271	1,012	318

*Neg. = no swollen follicles; 1X = one to five swollen follicles; 2X = six to 15 swollen follicles; 3X = 16 or more swollen follicles; 4X = all exposed follicles swollen.

*Manufactured by Vineland Poultry Laboratories, Vineland, N.J.

per cent showed six to 15 swollen follicles; 1.94 per cent showed one to five swollen follicles; and 0.34 per cent of the birds were negative. This test indicated that 1.0 mg. or more dried vaccine per cubic centimeter of diluting fluid was adequate to produce good takes.

The physical effects on chickens of pigeon pox vaccine when applied by the spray method was observed. Of 3,378 birds vaccinated, ranging from 1 day to 20 weeks of age at the time of vaccination, only 19 died or became sick from all causes in the 18-day period after vaccination. Of the 19 affected, 4 were in the 345 birds (1.13 %) that were less than 24 days old at the time of vaccination, while 15 were in the 2,943 birds (0.151 %) that were 10 to 20 weeks of age when vaccinated. None of the 90 birds between 24 days and 10 weeks of age was affected.

Experiments were started to determine the possibility of vaccinating young chicks with pigeon pox vaccine by the spray method. A breakdown of the vaccination work done on 1- and 4-day-old chicks and the type of takes which were produced as a result of vaccination are recorded (table 4).

The results of this test indicated that after the down on the leg had been removed, 1-day-old chicks appeared to be more susceptible to the application of the vaccine than those 4 days old. Approximately 75 per cent of the 1-day-old chicks showed 2X and 3X takes, whereas 80 per cent of the 4-day-old birds showed 1X and 2X takes.

The best results occurred when the Penn sprayer was used. The total volume of vaccine used with this apparatus was much higher than when the other sprayers were used. In the mechanics of spraying, the larger the quantity used, the greater the number of takes.

Fig. 1—Application of pigeon pox vaccine by the spray method to the feather follicles of the leg in a growing pullet.

Previously, the recommendations of all manufacturers have indicated that the application of a true pigeon pox vaccine would not be particularly effective on baby chicks. The results of these tests indicate that our thinking will be changed in the future if takes were produced on day-old chicks by plucking the down from the outer

TABLE 4—Type of Take Produced as a Result of Vaccination of 1- and 4-Day-Old Chicks with Pigeon Pox Vaccine Using the Spray Method

No. of chicks	Age of chicks (days)	Apparatus used for spraying	Amount (cc.)	Quality of takes*				No. of swollen follicles per bird (av.)	Birds with takes (%)
				Neg.	1X	2X	3X		
25	1	p-a†	5.0	0	5	4	16	12.8	100.0
25	1	P-S†	11.0	0	2	3	20	15.0	100.0
25	1	D-V-N†	1.5	11	13	0	1	1.6	56.0
25	1	S-B-V†	7.0	2	6	4	13	9.5	92.0
48	1	S-B-V	16.6	1	7	22	16‡	11.6	98.5
50	1	S-B-V	15.0	2	11	21	16	11.2	96.0
50	4	S-B-V	15.5	4	14	26	4‡	7.6	92.0
50	4	S-B-V	12.0	4	24	20	2	6.2	92.0

*Neg. = no swollen follicles; 1X = one to five swollen follicles; 2X = six to 15 swollen follicles; 3X = 16 or more swollen follicles.

†p-a = perfume atomizer; P-S = Penn sprayer; D-V-N = DeVilbiss nebulizer; S-B-V = small Burgess vibrocrafter.

‡Two birds died before takes were read on ninth day after vaccination.

Fig. 2—Typical pigeon pox takes following vaccination of 1-day-old chicks by the spray method.

surface of the leg and then spraying the high-titer pigeon pox vaccine on the exposed follicles. The immunity which these birds develop when the vaccine is applied at 1 day of age is good, and the birds are refractory to challenge with pigeon pox virus and produce small abortive fowlpox lesions when challenged with fowlpox virus, even when the chicks show 1X takes following spray application of the vaccine.

CHALLENGE RESULTS

The problems of challenging with pigeon pox virus and fowlpox virus have been stated. Abortive fowlpox lesions are produced when fowlpox virus is used for challenge on chickens which have a good and durable immunity as a result of vaccination with pigeon pox vaccine.

In one experiment, in which 99 chickens were vaccinated at 1 to 70 days of age with pigeon pox vaccine, of the 46 challenged three to 12 weeks later with pigeon pox virus, 44 developed no lesions and 2 developed typical pox lesions; of the 53 similarly challenged with fowlpox virus, all had lesions but they were typical pox lesions in only 3 birds and abortive pox lesions in 50.

CONCLUSIONS

1) A pigeon pox vaccine having a titer of 1:100,000 can be used successfully for application to chickens by the spray method to the feather follicles of any part of the body.

2) The virus particles must be fine enough to go into a suspension that will not block the sprayer, and the diluting fluid should contain sufficient glycerin to keep the sprayed solution in contact with the exposed follicles in the skin.

3) The quality of takes produced by the spray method was uniformly superior to those produced (in the few birds used) when the method of application was by brisk brushing. In many birds, every exposed follicle showed a take when the vaccine was sprayed.

4) When pigeon pox vaccine is applied to a bird, the quality and durability of immunity produced is, in general, in direct relationship to the number and area of follicles infected from the vaccination. The spray method of application ensures coverage of the maximum number of exposed follicles.

5) In the past, application of pigeon pox vaccine to baby chicks has not been recommended because attempts to immunize young chicks have been unsuccessful. The results obtained in these tests indicate that chicks can be successfully immunized with an immunity which is durable for a minimum of 12 weeks, if a vaccine of high titer is used by the spray method of application.

6) Since a variety of sprayers were used successfully, some hand-powered and some electrically powered, the spray method of application is apparently adaptable for all poultry farms. It will speed up inoculation with pigeon pox vaccine as compared with the brush method.

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Pox in Cows from a Vaccinated Child

Vaccine variola developed among cows after a child who had been vaccinated for the second time infected a cow while milking. This cow infected others while at pasture. A man, vaccinated only once, became infected while milking. The virulence of the virus had been increased by rabbit passage. —*Berl. und Münch. tierärztl. Wchnschr., March 15, 1956.*

Re-Tattooing Vaccinated Calves.—The re-tattooing, by veterinarians, of heifers whose ear tattoos have become invisible has been authorized by the California State Department of Agriculture. The veterinarian must be positive that he vaccinated the heifer as a calf.—*West. Dai. J., March, 1956.*

Of 106 isolations from children with tuberculosis, predominantly nonpulmonary in character, the organisms were of the bovine type in 37 and of the human type in 69.—*Vet. Bull., March, 1956.*

Incidence of Leptospira in Horses—A Laboratory Report

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During the last seven months of 1955, 183 samples of blood from horses were submitted to this laboratory by veterinarians for aid in diagnosing various illnesses. These animals were at race tracks and breeding farms in New York, New Jersey, and Virginia. They were of both sexes and 1 to 9 years of age. These samples were examined with dark field illumination and 85 (46%) were found positive for Leptospira, the severity of the infection appearing to vary from a few organisms to a large number per slide examined.

Of the 183 samples, 144 were cultured on tryptose phosphate broth at 37 C., and 113 (78%) of these cultures showed growth of bacteria other than spirochetes. Where leptospiras were present, as demonstrated by dark field examination, more often than not there was a secondary bacterial infection. Actually, 47 blood samples were positive for both Leptospira and a mixed bacterial infection, only eight positive for Leptospira alone, while 66 were negative for Leptospira and positive for other bacteria. Only 23 blood samples yielded no growth on the tryptose phosphate broth medium.

A few of the serums negative by dark field examination for Leptospira were cultured in Schüffner-Vorwoort medium, and leptospiras were recovered from three of these.

Studies are being continued.

[No information regarding the condition of the horses from which the blood samples came is included, since it was not available. However, this seems to indicate that Leptospira infection in horses is much more common than had been suspected. It also suggests that a positive titer must be interpreted with caution, such as in animals with periodic ophthalmia.—ED.]

From the Clinical Data Section, Veterinary Diagnostic Laboratories, New York, N. Y.

The average market hog produces enough meat for two persons for a given period and enough lard for three.—*U.S.D.A., March 21, 1956.*

"Silo-Filler's Disease" in Animals

Two cases of pulmonary congestion and edema are reported in men who had worked inside enclosed silos while they were being filled. One case was fatal. In one instance, several suckling pigs in the barn adjacent to the silo had died and, in another instance, 18 chickens had died.

Investigation at the University of Wisconsin, following previous similar experiences, revealed that the yellowish fumes and forage sometimes seen at the bottom of the chute in enclosed silos contained nitrates and nitrites. When sampled, these fumes contained 151 p.p.m. of nitrogen dioxide; the maximum safe concentration is 25 p.p.m. The more mature the corn, the less of this gas is produced. Its production stops within a few days.—*Proc. Mayo Clin., April 4, 1956.*

Aujeszky's Disease in Cattle

Approximately 60 of 143 cattle, in Arkansas, were affected with Aujeszky's disease in a period of 30 days, with 100 per cent fatality.

The cattle had been moved into drylots with hogs in November, 1955. One month later, a bull died of suspected rabies. The affected females showed temperatures of 105.0 to 106.5 F.; intense pruritus, with licking and rubbing of the flank, udder, and hindlegs; staggering gait and partial paralysis of the hindquarters; and swelling and ulceration of the vulva. Several animals appeared frenzied and aggressive, and pregnant cows showed marked sex excitability.

The swine were immediately removed from the lot. Later, when pseudorabies was suspected, Aujeszky's virus was isolated from the brains of 2 animals. Rabbits injected with brain material developed signs of "mad itch" and died. Aujeszky's antiserum neutralized the virus.

Treatment of all the cattle, two weeks after the disease appeared, with 2,000,000 units of penicillin each, failed to check development of new cases or to benefit those affected. In addition to swine, rats may be carriers of the disease.—*U.S.D.A., Feb., 1956.*

The possibility of using mink oil as a perfume base is being investigated at Rutgers University.—*Rep., Rutgers University, March, 1956.*

Melanoma of Eye and Oral Mucosa with Metastases in a Dog

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Primary melanomas are frequently observed in the eye of man, probably because of the heavy pigmentation of melanin in the choroid. Although melanomas are often observed in animals also, the primary pigment-bearing neoplasm is less frequently found in the eye.

A female Cocker Spaniel, 8 years old, was seen on Dec. 24, 1952. She had a marked dyspnea, a normal temperature, an enlarged left cervical lymph node, and a mushroom-shaped granulomatous mass on the left buccal mucosa. Cataracts were present in both eyes. The animal, which the owner reported had been in failing health for about a week, was too weak to stand, very thin, and heavily infested with lice.

After euthanasia and necropsy, specimens were submitted to the Armed Forces Institute of Pathology (Acc. 507824). Their report is as follows:

Eye (a)—There is a diffuse pigmentation in the center of the cornea. When the eye is opened on a horizontal plane it shows a 2-mm., opaque, elevated retinal lesion on one side of the equator and a pigmented nodule 2 mm. in diameter is situated at the margin of the pupil.

Eye (b)—Part of the cornea is denuded of epithelium. The eye, when opened on the horizontal plane, shows engorged blood vessels radiating from the optic disc and the margins of the pupil bound down to the cataractous lens. There is a lightly pigmented subretinal neoplastic mass, measuring 10 by 7 by 9 mm., between the ciliary body and the equator (fig. 1). Within this mass are several areas of necrosis. The cells contain large basophilic, spindle-shaped nuclei and rather scanty cytoplasm. The nuclei of the neoplastic cells are closely packed together in some instances. There is practically no supporting connective tissue. Large masses of melanotic pigment are scattered throughout the neoplasm (fig. 2). Mitotic figures are frequently seen. The histological picture is that of a very rapid-growing neoplasm.

Both kidneys present numerous irregular tumor masses projecting on the surface. The cross section reveals most of the tumor masses located in the cortex and measuring up to 1 cm. in diameter. The

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The writer expresses his thanks to the personnel of the Armed Forces Institute of Pathology, without whose diligent efforts this case report and other case studies would not have been possible.

histological picture of these neoplastic foci is similar to that described in the eye except for the practically complete absence of pigmentation.

The pancreas had neoplastic foci similar to that described in the kidney.

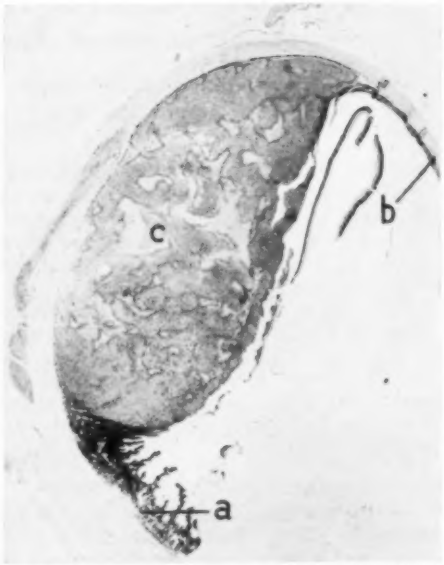
Grossly, the ovaries are not remarkable. There are several thin-walled cysts present. Microscopically, oogenesis appears to be going on in a normal manner. Atretic corpora lutea are present. In another section are neoplastic foci. In these, the cellular elements are slightly different than those foci in the other organs in that the nuclei are round or oval, frequently with distinct nucleoli, and the cytoplasm is quite distinct. Mitoses are numerous and practically no pigment is present.

Most of the lymph node has been replaced by a neoplastic mass.

Only a few of the tissues of the adrenal gland are recognizable as such, so complete has been the replacement of the normal architecture with neoplastic elements.

The diagnosis was: melanoma, ciliary body, eye with multiple metastases.

Although the lesion under consideration was found in the eye, one opinion on this case favored the oral mucosa, a common site of origin for this tumor in the dog, as being the primary site because there was junctional change in the epithelium overlying the oral mass.



—A.F.I.P. 5516543

Fig. 1—Cross section of the eye of the Cocker Spaniel showing large subretinal tumor: (a) ciliary body; (b) retina and sclera; and (c) tumor. x 7.

—A.F.I.P. 5516541

Fig. 2—Ciliary body of the eye showing invading melanin cells. x 330.

Some Observations on Further Attempts to Transmit Equine Infectious Anemia to Lambs and Pigs

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WHILE IT IS generally believed that equine infectious anemia is a specific disease of the horse and related solipeds (the mule, ass, and donkey), the susceptibility of other species of animals still remains a subject of controversy.

Although a great variability of opinion exists on this question, many of the early investigators who have attempted to transmit the disease to different species of domestic animals, other than equine, believe that pigs and lambs may be slightly susceptible.

LITERATURE CITED

The Japanese Commission,[1] Luhrs,[2] Oppermann,[3] Habersang,[4] Titze,[5] Kobe,[6] Kral, Macek, and Sobra,[7] and Kutsche[8] have reported evidence to indicate that young pigs may be slightly susceptible. On the other hand, Francis and Marsteller[9] were unable to transmit the disease to pigs. Romanow,[10] who carried out a series of tests on suckling pigs to check all work previously reported, was unable to obtain convincing evidence that pigs were susceptible. Zwick,[11] who summarized the transmission work on pigs, believed it was inadequate to justify making any basic conclusions.

Scherago,[12, 28] who recently investigated a suspected outbreak of infectious anemia in Mexico, reported that blood samples from sick horses involved in the outbreak produced the characteristic clinical symptoms and lesions of acute equine infectious anemia when injected into very young pigs. He further suggested the possibility of using such pigs as test animals in lieu of horses.

Concerning the susceptibility of sheep, the Japanese Commission,[1] Verge,[13] Kral *et al.*,[7] Theiler and Kehoe,[14] and Auermann[15] reported evidence to indicate that sheep may be slightly susceptible. However, Zwick,[11] Balozet,[16] Carré and Valleé,[17] Francis and Marsteller,[9] Todd and Wolbach,[18] and DeKock[19] reported that sheep were refractive to infection. Koljakow,[20] in his monograph on "Infectious Anemia in Horses," mentioned two additional investigators (Makarow and Chomutow) who were unable to infect lambs.

A series of recent studies on this problem were carried out in Japan by Miura *et al.*[21,22] In preliminary investigations, they found that most of the lambs injected with virus from horses with acute infection developed febrile reactions and a reduction in erythrocytes. Evidence was also obtained to indicate that the virus might invade the blood stream and persist in the organs of such lambs for at least 28 days. In further experiments, virus was demonstrated in the organs of a test lamb 77 days following injection of the virus. It was concluded that it may be possible to induce subclinical infection in lambs by injection of the virus.

In early studies carried out by U. S. Department of Agriculture investigators,[23] attempts to infect swine and sheep were without success. In more recent attempts by Department workers (Stein and Mott[24]) to infect lambs and pigs, temperature reactions were produced in 3 lambs and in 1 splenectomized pig, while 1 splenectomized pig and 1 normal pig showed no reaction following exposure to the virus. Blood collected from the reacting sheep and reacting pig 148 days after exposure failed to infect normal horses when injected subcutaneously.

In spite of all these investigations on transmission, the question of spontaneous infection in pigs and lambs and the epizootic significance of these animals as possible virus carriers was still undecided. The question as to whether pigs or lambs are suitable to use as diagnostic test animals in lieu of normal horses had likewise not been determined.

The experiments described in this report were designed and carried out to obtain additional information on these questions.

MATERIALS AND METHODS

The infectious anemia virus strain (Wyoming H 1529) used in these experiments consisted of virulent blood serum collected on Oct. 16, 1953, from an acute case of equine infectious anemia (horse 1529) experimentally infected with the virulent Wyoming strain. The serum was filtered and held in a deep-freeze refrigerator at a temperature of —70 C. for approximately 20 months before being used in the experiments.

The pigs used in the test were suckling pigs 5 weeks of age and weaned pigs 11 weeks of age, while the lambs used were approximately 4 months of age.

The susceptible horses used in the test were animals that had recovered from vesicular stomatitis. They weighed approximately 900 to 1,000 lb. and, like the pigs and lambs, were held under

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observation in screened isolation units provided with concrete floors. None of the animals used in the tests had previous contact with horses affected with infectious anemia.

Temperatures on all the test animals were taken and recorded at least twice a day. The test animals were all injected subcutaneously with the same strain of infectious anemia virus contained in the filtered horse serum (Wyoming H 1529) which had been passed through a No. 8 Manuler filter candle and tested for bacteriological sterility. As controls, 1 or more animals representative of each species were likewise exposed to filtered normal horse serum No. 1303. Finally, horse inoculation tests for the presence of virus were made on the pooled blood of test animals that showed temperature reactions following exposure to the virus or normal horse serum.

TEST OF VIRULENCE OF WYOMING STRAIN H 1529

As a control test on the virulency of the filtered horse serum obtained from the acute case, horse 1529, a normal test horse (No. 1538) was inoculated subcutaneously with 20 cc. of the filtered Wyoming H 1529 serum on June 15, 1955. After an incubation period of 12 days, horse 1538 developed symptoms of equine infectious anemia, showing that the exposure virus used on pigs and lambs was virulent (table 1).

TRANSMISSION EXPERIMENTS ON PIGS AND LAMBS

Filtered virulent horse serum (Wyoming H 1529) was injected subcutaneously in 20-cc. amounts into each of 5 suckling pigs, 3 weaned pigs, and 2 young lambs, and 20 cc. of filtered normal horse serum (H 1303) was injected into 4 suckling pigs and 2 young lambs to serve as controls (table 1).

RESULTS OF INJECTIONS

All of the test pigs and all of the test lambs inoculated with either the virulent or normal horse serum developed a mild temperature reaction on the third to thirteenth day following exposure. There was

TABLE I—Results of Injection of Virulent (Infectious Anemia) and Normal Horse Serum into Horses, Pigs, and Lambs

Material injected 6/15/55	Species	Animal No.	Age	Results	7/22/55		Horse No.	Results to 8/26/55	Challenge material injected 8/26/55	Results
I.A. virus, Wyoming horse 1529 (10/16/55)	Swine	2791	5 wk.	Died of injury						
	Swine	2792	5 wk.	Temp. reaction	Bled & blood pooled	50 cc. injected into				
	Swine	2793	5 wk.	Temp. reaction			1523	No reaction	I.A. virus*	I.A. symptoms on 11th day
	Swine	2794	5 wk.	Temp. reaction						
	Swine	2795	5 wk.	Temp. reaction						
	Swine	2796	11 wk.	Temp. reaction						
	Swine	2797	11 wk.	Temp. reaction	Bled & blood pooled	50 cc. injected into	1524	No reaction	I.A. virus*	I.A. symptoms on 12th day
	Swine	2798	11 wk.	Temp. reaction						
	Lamb	282	4 mo.	Temp. reaction	Bled & blood pooled	50 cc. injected into	1539	No reaction	I.A. virus*	I.A. symptoms on 12th day
	Lamb	283	4 mo.	Temp. reaction						
	Horse (normal)	1538	—	Temp. reaction, I.A. symptoms	Bled on 12th day; serum frozen and used as challenge virus*					
Normal horse serum	Swine	2799	5 wk.	Temp. reaction						
	Swine	2800	5 wk.	Temp. reaction	Bled & blood pooled	50 cc. injected into	1521	No reaction	I.A. virus*	I.A. symptoms on 12th day
	Swine	2801	5 wk.	Temp. reaction						
	Swine	2802	5 wk.	Temp. reaction						
	Lamb	284	4 mo.	Temp. reaction	Bled & blood pooled	50 cc. injected into	1520	No reaction	I.A. virus*	I.A. symptoms, died on 24th day
	Lamb	285	4 mo.	Temp. reaction						
	Horse (normal)	1542	—	No reaction						

*I.A. (infectious anemia) virus, Wyoming horse 1538 (6/28/55).

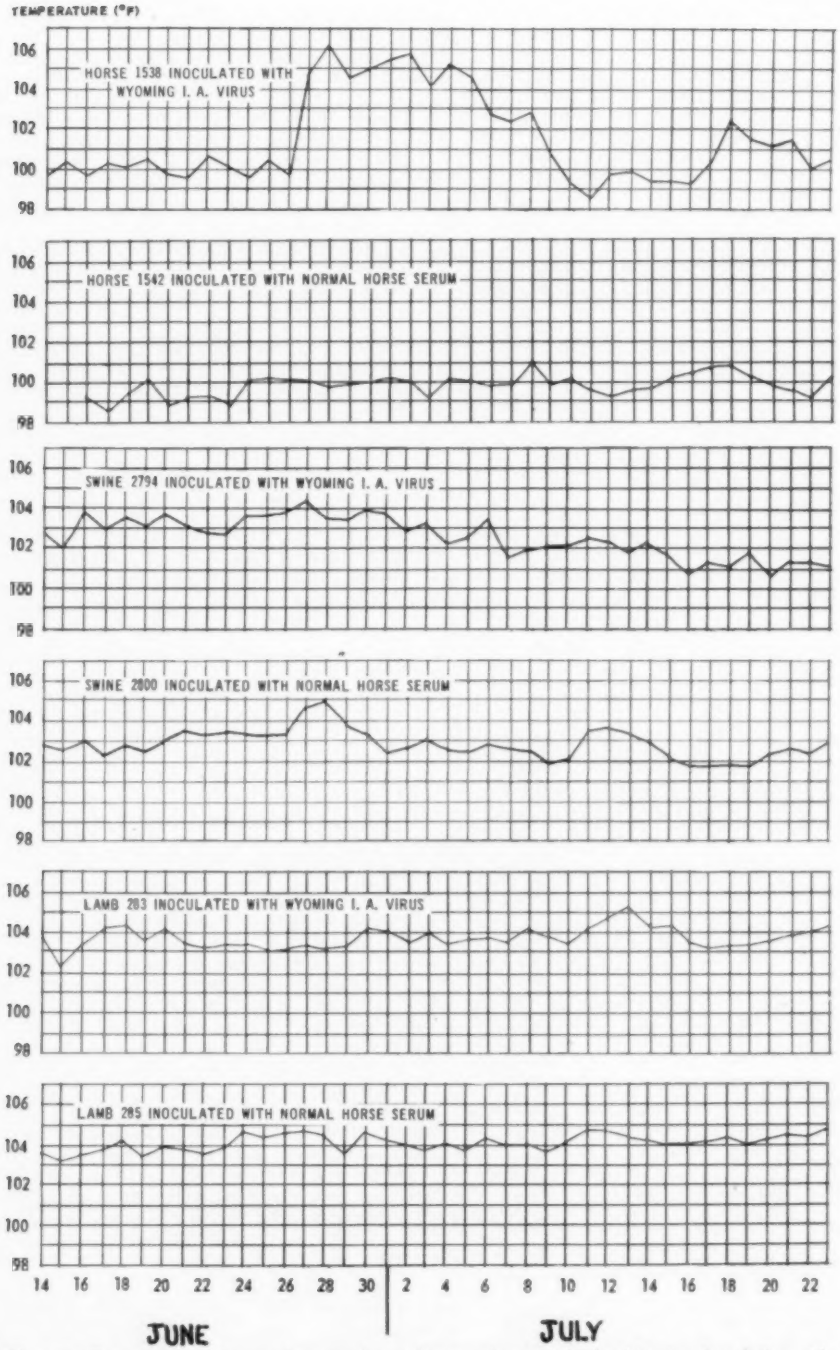
TEMPERATURE (°F)
HORSE 1538 INOCULATED WITH WYOMING I. A. VIRUS
HORSE 1542 INOCULATED WITH NORMAL HORSE SERUM
SWINE 2794 INOCULATED WITH WYOMING I. A. VIRUS
SWINE 2800 INOCULATED WITH NORMAL HORSE SERUM
LAMB 283 INOCULATED WITH WYOMING I. A. VIRUS
LAMB 285 INOCULATED WITH NORMAL HORSE SERUM
106
104
102
100
98
14 16 18 20 22 24 26 28 30 2 4 6 8 10 12 14 16 18 20 22
JUNE
JULY

Chart 1—Comparison of temperature graphs on horses, pigs, and lambs following inoculation with virulent horse serum from an acute case of infectious anemia and following inoculation with normal horse serum.

no appreciable difference in the occurrence of the febrile reactions in the animals receiving the virulent horse serum and those injected with normal horse serum. Aside from the mild transient temperature reaction, none of the test pigs or test lambs showed any loss of appetite or other symptoms suggestive of infectious anemia during the 36-day period they were held under observation.

All of the pigs and lambs used in the test, except 1 pig that died of an injury, were destroyed on the thirty-sixth day and subjected to necropsy. On postmortem examination, none of the animals revealed lesions indicative of equine infectious anemia. Histopathological examination of tissue sections collected from the test animals also failed to show any pathological alterations characteristic of infectious anemia.

Test horse 1538, injected with the same amount and same lot of virulent horse serum received by the test pigs and test lambs, developed acute symptoms of infectious anemia after an incubation period of 12 days, while a second test horse (No. 1544), injected with the same lot of normal horse serum received by the test pigs and test lambs, remained normal for 102 days. A comparison of the type of temperature reactions that occurred in the pigs, lambs, and horses is shown in chart 1.

TESTS FOR VIRUS IN BLOOD OF TEST PIGS AND LAMBS

Pooled blood samples, representing each group of pigs and lambs used in the transmission tests and which were composed of the individual blood samples collected from each pig or lamb in the different groups on the thirty-sixth day of the experiment, were tested for the presence of virus by injection into susceptible horses. All of the test horses injected with the pooled blood samples from the different groups of test pigs and test lambs that had been exposed to either virulent or normal horse serum failed to show any reaction in 35 days but, when subsequently exposed to known infectious anemia virus collected from horse 1538 (an acute case), all the horses developed symptoms of infectious anemia in ten to 12 days. The results of these horse-inoculation tests indicated that all the test horses were susceptible and that none of the pooled blood samples from the test pigs or lambs contained active infectious anemia virus on the thirty-sixth day following exposure (table 1).

DISCUSSION

From the results obtained in these studies, it was concluded that the mild, transient temperature reactions that occurred in the test pigs and lambs, as well as the controls, were probably due to the effects of foreign proteins contained in both the virulent and normal horse serum.

During the course of this experiment, it was demonstrated that the virus in virulent filtered horse serum from an acute case of infectious anemia may remain fully active when stored at −70 C. in a deep freeze refrigerator for 20 months.

Incidentally, further evidence was also obtained to confirm our previous observations that no cross immunity to infectious anemia is established in horses by previous injections of vesicular stomatitis virus. The horses used in this experiment were immune to vesicular stomatitis but, when exposed to the virus of infectious anemia, all the horses developed typical symptoms of that disease. In this connection, it should be mentioned that in early studies carried out by U.S. Department of Agriculture investigators (Stein, Mott, and Gates[25]) on the possibility of cross immunity of infectious anemia virus with other viruses, it was demonstrated that horses immunized against different types of vesicular stomatitis virus or eastern or western equine encephalomyelitis virus were fully susceptible to the virus of equine infectious anemia. It was also shown that horses with chronic or carrier cases of infectious anemia were susceptible, experimentally, to the viruses of vesicular stomatitis[26] and equine encephalomyelitis.[27]

SUMMARY AND CONCLUSIONS

Young pigs and lambs, following injection either with virulent horse serum from an acute case of infectious anemia or with normal horse serum, developed mild, transient temperature reactions with no other symptoms of infectious anemia. A horse injected with the same virulent horse serum from an acute case of infectious anemia developed symptoms of acute infectious anemia in 12 days, while a horse injected with the same normal horse serum remained normal for 102 days, indicating that the temperature reactions in the pigs and lambs were probably due to injections

of foreign proteins of horse origin. None of the reacting pigs or lambs exposed to infectious anemia virus were carriers on the thirty-sixth day.

Suckling pigs, weaned pigs, and young lambs are not suitable for use as diagnostic test animals or for carrying out other types of experimental work on equine infectious anemia. Serum from an acute case of infectious anemia, after storage at −70 C. for 20 months, was still virulent. Horses that had recovered from vesicular stomatitis were fully susceptible to the virus of infectious anemia. The horse-inoculation test (that is the injection of filtered horse serum from suspected cases of infectious anemia into young, healthy susceptible horses) still constitutes the only certain method of determining if the blood contains virus.

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Aftosa in Spain.—Since May, 1955, foot-and-mouth disease (aftosa) has appeared 16 times in eight regions of Spain, with a total of 750 cattle and swine affected. Animals exposed in the last outbreak were slaughtered; prior to that, animals in a ring around the infected centers were vaccinated. Type C virus was isolated.—*Circ. 112, Off. Internat. des Épizoot., April 24, 1956.*

What Is Your Diagnosis?

Because of the interest in veterinary radiology, a case history and accompanying radiographs depicting a diagnostic problem are usually published in each issue of the JOURNAL.

Make your diagnosis from the picture below—then turn the page ▶

History.—A female cat, 10 months old, cried with pain when attempting to walk or run. The cat arched its back and assumed a crouching attitude when attempting to stand or move. This peculiar stance and hypersensitivity had been present since early life. The pelvis and both femurs had been previously fractured (fig. 1). Two litter mates had a similar condition. The diet of this cat had been supplemented with vitamins, calcium, and phosphorus for some time.

Figure 1

(Diagnosis and findings are reported on next page)

Here Is the Diagnosis

(Continued from preceding page)

Diagnosis.—Osteogenesis imperfecta (paper bone disease).

Comments (by Gerry B. Schnelle, V.M.D., Boston, Mass.).—The radiograph (fig. 2) shows characteristic osteogenesis imperfecta in the kitten.

Fig. 2—Notice the collapsed pelvis, the repaired fractures (arrows), and the thin cortex of the bones.

The diagnostic features are: (1) the great lack of contrast between the bones and soft tissues; (2) the extremely thin and fine cortex of the bones; and (3) the lack of granular appearance of the medullary portion of the bones as seen in radiographs of bones of normal cats.

Both femurs had been fractured and had healed with nothing to show for the healing process except deviation at the points of fracture. The pelvis appears collapsed and this is often the most serious aspect of osteogenesis imperfecta.

This disease occurs most commonly in Siamese cats but also in other cats, including the "street" variety. It has also been found in dogs (Irish Setter, Standard Poodle, and Norwegian Elkhound).

An excellent article on this subject, "Idiopathic Familial Osteoporosis in Dogs" by E. Calkins, D. Kahn, and W. Canada, of the Harvard Medical School, Boston, was presented at the New York Academy of Science on Jan. 10 and 11, 1956. Reprints probably can be obtained by contacting the authors.

Our readers are invited to submit case histories, radiographs, and diagnoses of interesting cases which are suitable for publication.

This case was submitted by W. H. Riser, Skokie, Ill.

The Pathogenesis of Canine Histoplasmosis

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Cincinnati, Ohio

Several publications have highlighted the epizootiology and pathology of histoplasmosis in dogs but no specific study has been made to demonstrate the portal of entrance.

DeMonbreun[3] observed the first spontaneous case of canine histoplasmosis and produced the disease experimentally by feeding puppies Histoplasma organisms in milk. This has led many to believe that spontaneous histoplasmosis infection may occur by way of the alimentary tract. In a study of 21 cases of spontaneous canine histoplasmosis, Robinson and McVickar[11] concluded that the gastrointestinal tract was the most common portal of entry. They suggested that the organisms are ingested by mouth, produce lesions in the intestines, and then get to the lungs via the blood stream.

A difference of opinion is expressed by Menges[7,8] who reported that naturally occurring infections are probably the result of inhalation of spores, thus accounting for the abundance of lesions in the lungs.

In a review by Cole *et al.*,[2] it is of interest that "pulmonary nodules on x-ray" were the most consistent clinical finding in 28 of 31 cases. No definite statement is made concerning the portal of entry or the site of the primary lesion.

Farrell[5] produced experimental histoplasmosis in dogs by intratracheal inoculation but failed by the gastric route.

We had the opportunity to study a few cases thoroughly and have learned that the lung is the portal of entry and that a primary complex is formed analogous to the findings in man.[12]

CASE REPORTS

Case 1 (267).—A mongrel was skin-tested with histoplasmin after necropsy of another dog from the same farm had revealed disseminated histoplasmosis. When the skin test was positive with dilutions of 1:10 and 1:100, the mongrel was killed. At necropsy, a partially calcified subpleural focus, about 6 mm. in diameter, was found in the diaphragmatic lobe of the right lung and the hilar lymph nodes were enlarged.

Fig. 1 (Case 1)—The healing primary focus is a sharply circumscribed, partially caseated or calcified nodule; generally subpleural, the focus can be found in any lobe of the lungs.

Microscopically, the caseated focus was found to be well circumscribed but not encapsulated; it consisted of proliferating epithelioid cells. The overlying pleura was only slightly thickened. Regional lymph nodes contained similar foci of epithelioid cell tubercles with central necrosis. Numerous organisms were demonstrated microscopically in the pulmonary and lymph node component of the primary complex. The rest of the lung and the other organs showed no pathological changes.

Six essentially identical cases were studied subsequently, the findings of which are summarized in table 1. Animals 1 to 4 were young mongrels from two farms where histoplasmosis had been found in human beings. Animals 5 to 7 were old dogs obtained from farms in the Greater Cincinnati area, which had no clinical disease.

DISCUSSION

The 7 dogs lived in the endemic area of histoplasmosis. The circumstances under which they came to necropsy varied considerably. Four were destroyed during an epidemiological survey of a farm, while the others were collected as random samples of old dogs which were expected to be carriers of this disease.

The portal of entrance of the organism in all 7 animals obviously was the respiratory tract. A sharply circumscribed, caseated pulmonary focus was found which in all aspects could be compared with the lesions in man, not only in persons with histoplasmosis but also in those with other

From the Clinical Laboratories, Jewish Hospital, Cincinnati, and the Laboratory of Mycology (Departments of Dermatology and Pathology), Cincinnati General Hospital, Cincinnati, Ohio.

This research was in part supported by grant E-576 of the National Institutes of Health.

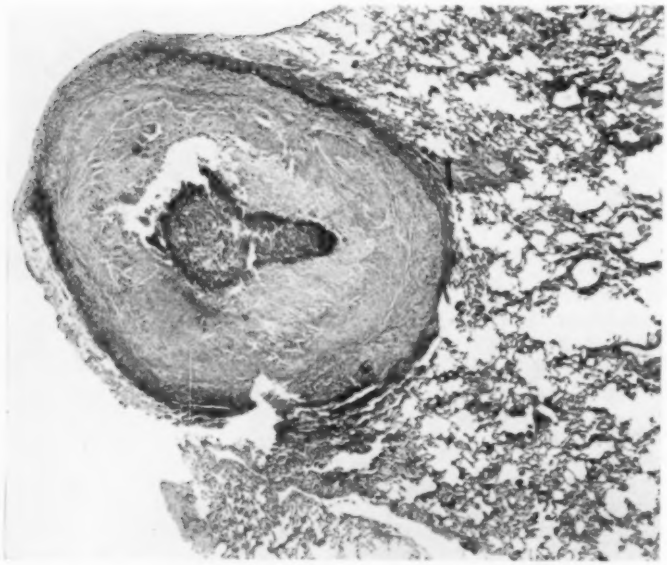

Fig. 2 (Case 4)—Microscopically, a rather thin fibrous capsule separates the primary focus from its surroundings. The center of this lesion has calcific deposits. Organisms are found especially in the center of the lesion. Hematoxylin and eosin stain; x 28.*

(Reproduced from "Histoplasmosis" by F. N. Silverman, J. Schwartz, M. E. Lahey, and R. P. Carson, in Am. J. Med., *19*, (1955): 410-459.)

granulomatous diseases.[10] The regional lymph nodes seemed to be less diffusely involved than is generally seen in man.

It is important to remember the concept, which apparently was first described clearly by Parrot,[9] indicating that "the lymph nodes of the lungs reflect like a mirror the lesions occurring in the parenchyma

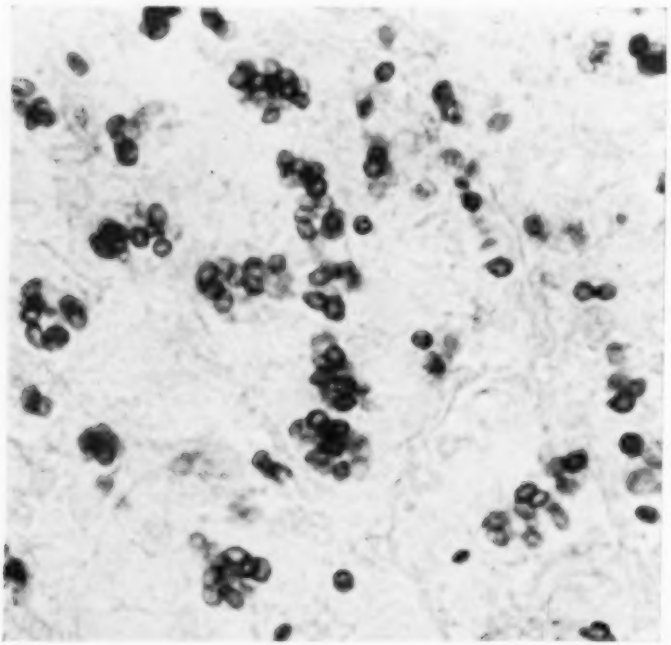

Fig. 3 (Case 5)—Innumerable organisms, 2 to 5 μ in size can be demonstrated with appropriate stains. They are generally not seen with hematoxylin and eosin stain. Grocott's silver stain; x 1,000.

TABLE I—Summary of Findings in Reference to the Primary Complex in Canine Spontaneous Histoplasmosis

Dog	Pulmonary lesion	Regional lymph nodes	No. of organisms	Skin test (histoplasmin)
1	Partially calcified; 6-mm., r. diaphragm. lobe.	Active disease	Numerous	Positive
2	Caseated and active; 10-mm., l. diaphragm. lobe.	Active disease	Moderate	Positive
3	Caseated and active; 4-mm., l. diaphragm. lobe.	Caseated and active	Moderate	Positive*
4	Partially calcified; 3-mm., l. diaphragm. lobe.	Active disease	Moderate	Positive**
5	Caseated and active; 5-mm., l. upper lobe.	Active disease	Numerous	Not done
6	Chalky, almost healed; 5-mm., l. upper lobe.	Active disease	Numerous	Not done
7	Calcified, inactive; 5-mm., l. upper lobe.	Scar; inactive	Numerous	Not done

*Several moderately active satellite nodules in regional pulmonary tissue.

**An independent (second) complete primary complex was found on the opposite side. The pulmonary lesions and the lymph nodes contained yeast cells which were morphologically consistent with Histoplasma capsulatum.

r. = right; l. = left.

and vice versa." This concept of the primary complex is extremely important for the understanding and determination of the portal of entrance of any infectious disease. It has been shown, especially by Ghon and Kudlich,[6] that this law of Parrot's applies to all organs. Generally speaking, only if a primary parenchymal focus plus involved regional lymph nodes are seen are we entitled to assume to have found the portal of entrance.

In man, it has been shown that, in the endemic[12] area of histoplasmosis, such healed complexes may be found in the lungs in 67 per cent of random necropsies. The calcifications and number of foci depend on the age of the animal examined. Obviously, the average age or time of exposure of animals will, as a rule, be much less than in man. On the other hand, Emmons and co-workers[4] have demonstrated that *Histoplasma capsulatum* may be cultured from a great many animals in the endemic area.

SUMMARY

Seven dogs from the endemic area of histoplasmosis showed uniformly typical primary complexes consisting of discrete, generally single, pulmonary, typically subpleural nodules in the lungs and in the satellite lymph nodes. It is concluded that the lung is the principal portal of entrance for infection with *Histoplasma capsulatum* in dogs, as it is in man.

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Toxicity Studies on Captan-Treated Corn in Pigs and Chickens

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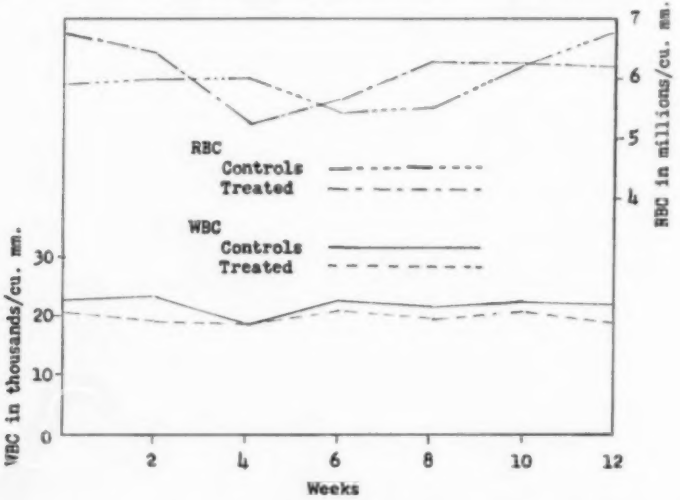
Urbana, Illinois

TREATMENT of seed grains with fungicidal agents is an established practice. If more grain is treated than is sold for seed purposes, the surplus presents a problem. Some of the fungicidal agents are toxic, and grain treated with the usual recommended amounts of these should not be fed to livestock. Acute and subacute toxicity studies on laboratory animals with the fungicide, captan (N-trichloromethylthiotetrahydrophthalimide) suggest that it has a low toxicity.[2] Limited studies on the toxicity of this chemical to pigs and cattle[1,3] indicate that it also has low toxicity for these animals.

It appeared desirable to conduct a feeding trial, using corn treated with captan, with pigs and chickens under ordinary feeding conditions.

PROCEDURE

Two trials were conducted with pigs. In the first trial, 10 Yorkshire gilts were used—7 in the principal group and 3 in the control group. Six litter mate Yorkshire pigs were used in the second trial; 2 gilts and 2 barrows comprised the principal group, and 1 gilt and 1 barrow the control group. The principal pigs were fed a mixed ration which contained corn treated with 0.93 oz. of captan per 100 lb. This was fed in a self-feeder for 96 days. The control pigs were fed a ration of the same composition except the corn was untreated. Automatic waterers were used. The pigs were maintained in similar lots with adequate shelter. The concentration of captan on the corn was 0.058 per cent and, in the mixed ration, it was 0.048 per cent. The composition of the ration is given in table 1.



Graph 1—Total erythrocyte and leukocyte counts of control pigs and those fed captan-treated corn.

Blood from each pig was collected from an ear vein for total erythrocyte, leukocyte, and differential leukocyte counts. At the conclusion of the feeding trial, the hogs were weighed and slaughtered, and liver, heart, kidney, diaphragm, and fat tissues

From the University of Illinois Agricultural Experiment Station, Urbana.

This study was supported in part by a grant from the California Spray-Chemical Corp., Richmond, Calif.

Captan was applied as orthocide 75 seed protectant (California Spray-Chemical Corp.) at the rate of 1.25 oz./100 lb. of shelled corn.

The present address of Dr. Smith is Kansas State College, Manhattan, and of Dr. Morrill, Michigan State University, East Lansing.

TABLE 1—Composition of Ration Fed to Pigs

Ration contained	Pounds
Ground yellow corn	1,700.0
Dehydrated alfalfa meal	50.0
Soybean oil meal	250.0
Ground limestone	20.0
Steamed bone meal	20.0
Salt	10.0
Trace minerals, vitamins, and antibiotic supplement	7.5
Total	2,057.5

were collected for chemical analysis. Liver and kidney tissues also were obtained for histopathological study.

Forty White Plymouth Rock chicks, 2 days of age, were divided into two groups. One group of 30 chicks was placed on a high-energy ration containing 55 per cent shelled corn which was treated with 0.93 oz. of captan per 100 lb. The concentration of captan in the mixed ration was 0.032 per cent. The remaining 10 birds were fed a ration of the same composition except the corn was untreated. There was equal distribution of roosters and pullets in each group. The chicks were placed in separate electric brooders until 4 weeks of age, at which time they were moved to a well-ventilated house where they were fed from open feeders. There was no mortality in either group. When the birds had been on these rations 74 days, they were weighed and dressed.

RESULTS

Captan did not appear to affect the palatability or nutrient quality of the ration. In trial 1, the control pigs made average daily gains of 1.54 lb., with a feed efficiency of 3.58 (table 2); the principal pigs averaged daily gains of 1.44 lb., with a feed efficiency of 3.01 (table 2). In trial 2, the control pigs made average daily gains of 1.59 lb., with a feed efficiency of 3.11; the principal pigs averaged daily gains of 1.62 lb., with a feed efficiency of 3.08 (table 3). Gross examination of all organs at the time of slaughter revealed no pathological lesions. Histopathological study of liver and kidney tissues failed to reveal the presence of significant variations. Chemical analysis* did not reveal the presence of captan in any of the tissues examined.

The blood studies revealed little difference between the two groups of pigs. There was some fluctuation in the total leukocyte counts and an increase in the percentage of segmented neutrophils but, since this occurred in both groups, it is doubtful that the captan was a factor (graphs 1, 2, and 3) in this variation.

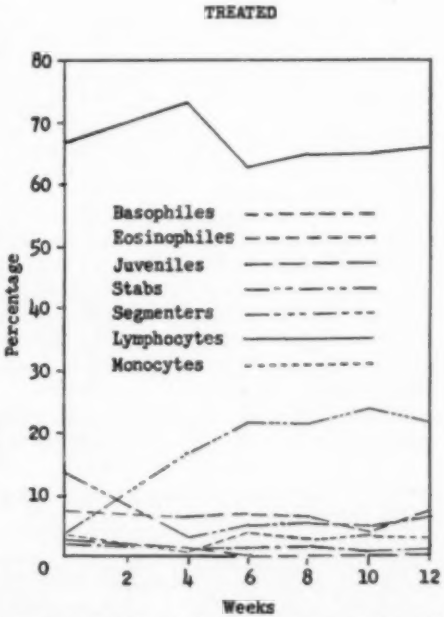
The chicks fed the treated ration gained at a slightly faster rate than the control chicks. The average weight of these chicks was 3.25 lb. at 10½ weeks and the control chicks averaged 3.12 lb. The difference in weight is statistically significant at the 1 per cent level.

There was no evidence of gross pathological changes in any of the birds. The meat of the chickens fed the treated ration did not have any detectable abnormal flavor.

TABLE 2—Weight Gain and Feed Efficiency of Pigs Fed Captan-Treated Corn for 96 Days (Trial 1)

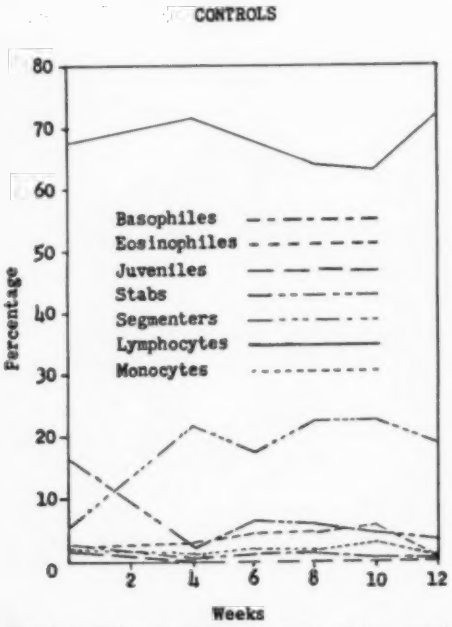
Pigs	Ave. initial weight	Ave. final weight	Gain	Feed efficiency*
Treated	112	251	139	3.01
Control	157	305	148	3.58

*Refers to pounds of feed consumed per pound of gain in body weight.



Graph 2—Differential leukocyte counts of pigs fed captan-treated corn.

*Chemical analysis of tissues was conducted by Dr. James Hansen of the California Spray-Chemical Corp., Richmond, Calif. The method will detect as little as 0.1 p.p.m.



Graph 3—Differential leukocyte counts of the control pigs.

DISCUSSION AND SUMMARY

Pigs and chickens were fed, without harmful effects, balanced rations which contained captan-treated corn. This conclusion is based on the favorable weight gains in the pigs and chickens and the absence of detectable pathological changes in the tissues of these animals.

Pigs fed the captan-treated ration had slightly better feed efficiency than the controls. The weight gains of the pigs used in this study were nearly identical with those obtained in other trials in which pigs of similar weight were fed a ration of the same composition but which contained untreated corn.

Chickens fed captan-treated corn had statistically significant increased gains over the controls. The mode of action by which captan produced increased weight gain in the chickens has not been determined. The amount of captan (580 p.p.m.) on the corn used in this study is the amount regularly recommended to treat corn used for seed.

TABLE 3—Weight Gain and Feed Efficiency of Pigs Fed Captan-Treated Corn for 96 Days (Trial 2)

Pigs	Ave. initial weight	Ave. final weight	Gain	Feed efficiency*
Treated	57	212	155	3.08
Control	55	207	152	3.11

*Refers to pounds of feed consumed per pound of gain in body weight.

References

[1]Anon.: A Study of the Effect of Feeding Orthocide-Treated Seed to Hogs. Rep. from California Spray-Chemical Corp. Lab., Haddonfield, N. J., 1952.

[2]Anon.: A Preliminary Toxicological Study of SR-406, a Fungicide. Bull. Inst. Indust. Med., New York University, Bellevue Medical Center, New York, N. Y., 1949.

[3]Johnson, Donald F.: A Toxicity Test of N-Trichloromethylthiotetrahydrophthalimide. Southwest. Vet., 8, (1954): 20-22.

Anticoagulants and Vitamin K_1

The mechanism of action of rodenticides such as warfarin and other acylindandiones is probably by inhibtion of the formation of prothrombin, or other coagulation factors in the liver, with a concomitant increase in capillary permeability. Their effect in small daily doses is well established.

The effect of these rodenticides on increased plasma coagulation time, after a single dose, was studied in rabbits. Warfarin was relatively ineffective but diphenylacetylindandione was a powerful anticoagulant. Vitamin K_1 was effective in reversing this increased plasma coagulation time.—*J. Agric. and Food Chem., Feb., 1956.*

Phenothiazine and Ox Warbles.—When phenothiazine was fed free choice—1 part to 3 parts of mineral—at the Animal Disease Laboratory, Auburn, Ala., 6 treated cattle averaged 8 grubs each, whereas 6 untreated cattle averaged 36.—*Breeder's Gaz., May, 1956.*

Rabbit Antibodies and Plant Viruses.—Antibodies in the blood of living rabbits, for use in research against major virus diseases of crop plants, are being developed by the Department of Agriculture. The specific antiserum will be used to identify these viruses more rapidly than is possible by other methods.—*Feed Bag, March, 1956.*

The American Association of Equine Practitioners—Its Objectives

The publication in this issue of several papers presented at the second annual meeting of the American Association of Equine Practitioners last December (*see* the JOURNAL, Feb. 15, 1956, p. 221) stimulates comment on the Association, most of the members of which specialize in racing and pleasure-horse practice, and its objectives.

Organized in 1955 by a group of veterinarians concerned chiefly about the relationship of their profession with horse racing, A.A.E.P.'s purposes are to elevate the standards of veterinary practice; to promote research in, and knowledge of, equine diseases as aids to improving such practice; to help the various agencies concerned with horse racing to improve its veterinary aspects; and to improve relationships with those agencies and with horsemen in general.

The realization of these objectives is necessary, if the professional status of veterinarians connected with horse racing in one capacity or another is to be safeguarded and placed on an appropriate level. Many veterinarians serve in official capacities with racing commissions or with track managements to supervise or conduct various examinations and tests on race horses to determine their physical condition, soundness, and racing fitness. Altogether, their responsibilities, functions, and services are numerous and special in nature. It is important that these services be performed under conditions that will not reflect unfavorably upon veterinarians as individuals or upon the profession as a whole.

A definite public interest is also involved, since it is the race-going public which, in the final analysis, supports the horse-racing industry and justifies the efforts of those devoted to "improving the breed" of race horses. Figures from the Feb. 15, 1956, issue of *The Blood Horse* illustrate the public interest aspect of horse racing. In 1955, the 24 states in which parimutuel wagering is permitted had a total of nearly 3,000 days of Thoroughbred racing at the various tracks; total attendance was nearly 28,000,000; the parimutuel turnover totaled over $2 billion and nearly $70 million was distributed in stakes and purses.

These figures do not include harness-racing tracks and fair meetings which accounted for an additional 2,000 days (or nights) of racing, nearly 15,000,000 attendance, about $600 million in parimutuel turnover, and some $15 million in purses and stakes distributed.

Several years ago, the author of a book on Thoroughbred racing and breeding described the race track veterinarian as "a college man who has chosen Thoroughbred medicine as a career." He mentioned a number who had gained outstanding reputations in that work: the late Cassius Way who "was lured from stanchioned cows to racing Thoroughbreds"; the late W. W. Dimock whose professional work "led to journeys overseas" to demonstrate his special knowledge and techniques. Also mentioned were a number of other men who have contributed greatly to horse racing and the veterinary profession's recognition and good reputation in that sport.

The number of veterinarians engaged solely in equine medicine is not large; the 1954 "AVMA Directory" so identified 114; the 1956 edition lists 126. The 10 per cent increase may not be especially significant but is noteworthy. These men, plus the considerable number of veterinarians who have official or unofficial connections with horse racing and society horse shows, comprise a sizeable group who are conscious of the veterinary profession's interest in, and responsibilities to, the pleasure horses and the breeding and racing of both Thoroughbred and Standardbred horses.

The American Association of Equine Practitioners can make a definite contribution to this field of professional work and the problems peculiar to it. Its program deserves the active interest and support of all veterinarians who are engaged in various phases of equine practice.

Spring pig production in nine corn belt states is expected to decrease 7 per cent from 1955, in contrast to the 3 per cent decrease indicated in December.—*Prairie Farmer, April 21, 1956.*

(Continued from adv. p. 12)

service activities into a single organization composed of one professional group—veterinarians.

The Meat Inspection Branch, Agricultural Research Service, U.S. Department of Agriculture, has operated the internationally recognized federal meat-inspection system since 1891. From inception to present day, this system under federal law has been directed, supervised, and operated by graduate veterinarians and their veterinary-trained lay assistants.

5) MILITARY VETERINARIANS AS FOOD INSPECTORS

The inspection of food products by military veterinarians to assure their wholesomeness for human consumption is basic. Military history does not record a single incident comparable to the food-poisoning outbreaks of the Spanish-American War, in histories of World War I, World War II, or the Korean episode.

Because of the fact that many diseases of animals are transmissible to man through the ingestion of infected animal foods, there is no professional group more qualified to determine the suitability of such products for human consumption than the veterinarian. In the military service, animal food products constitute more than 40 per cent of the soldier's ration and 65 per cent of the cost. In addition to the health hazards from common diseases, animal-food products are potential mediums for the transmission of human diseases when contaminated and may form toxic substances in the process of deterioration.

The Veterinary Corps makes available for the Surgeon General a military organization under his direction that assures the safety of troop food supply from point of origin to issue. Regardless of the controls exercised in the production, shipment, or storage of food products, the most important single factor in the entire chain is the condition at issue to troops. It is self-evident that the responsibility at issue in the field must be borne by the military and, to discharge it, a military organization is essential for the purpose.

Food supplies for the use of the military establishment are peculiar in nature, due largely to the fact that supply lines extend to all points on the globe. To assure that such food supplies reach the soldier in sound condition with a minimum of loss and deterioration, special processing, packing, and packaging are required in order that such products will withstand the wear and tear of shipment, storage, and transshipment prior to issue to the ultimate consumer. For these reasons, rigid adherence to special requirements must be maintained to assure that food products for military use have been properly prepared, packaged, shipped, and stored, and thus make it essential that a technical organization capable of making these distributions be an integral part of the military establishment.

In its advisory capacity to the Quartermaster General, the Veterinary Corps assures the purchasing and contracting officer that foods procured comply with the specification requirements of the purchase instrument with regard to type, class, grade, packaging, and marking.

During fiscal year 1955, the Veterinary Corps performed procurement inspection involving the purchase of 1,469,026,000 lb. of foods of animal origin (approximate cost, $661,061,700).

The total amount of all food products inspected by the Veterinary Corps during fiscal year 1955, including surveillance inspection, was 22,240,070,000 lb. (13,151,355,000 lb. in oversea areas; 9,088,715,000 lb. in CONUS).

During the period, 69,000 inspections of source establishments were made in connection with food procurement on a worldwide basis.

6) FOOD INSPECTION PERSONNEL

Both Veterinary Corps officers and enlisted food-inspection specialists are utilized by the Department of Army to perform food inspection functions. The range of such utilization is approximately one officer to four enlisted specialists. All enlisted specialists work under the supervision of officers in a manner similar to that which exists in the Meat Inspection Division, Agricultural Research Service, U.S.D.A., wherein lay assistants perform certain inspection tasks under the supervision of graduate veterinarians.

Enlisted food inspection specialists are employed by the Department of the Army to perform that portion of food inspection activity which is routine in nature and may be adequately accomplished without the technical background required of graduate veterinarians. Their utilization is practiced to the maximum in order to conserve on professional personnel and reduce the number of officers. However, enlisted personnel can not be used entirely because they do not possess the knowledge that the Veterinary Corps officer has acquired through his professional training with reference to the cause, recognition, effect, and control of animal diseases transmissible to human beings. Neither is he familiar with the basis for the institution and application of public health measures designed to protect the soldier's health from unwholesome, contaminated foods. For purposes of illustration, it may be said that enlisted food-inspection specialist bears the same relationship to the Veterinary Corps officer as does the lay inspector of the Department of Agriculture to the graduate veterinarian.

7) FUNCTIONS OF THE VETERINARY CORPS IN CURRENT RESEARCH AND DEVELOPMENT

a) Chemical Warfare.—Veterinary Corps officers are responsible for developing methods of protection and decontamination of foodstuffs exposed to chemical warfare agents; also the development of protective and therapeutic measures for use on animals of military significance.

b) Biological Warfare.—Veterinary Corps officers are engaged in biological investigations concerned with interpreting the results of animal experimentation to human application. In addition they participate in research programs designed to establish offensive capability in biological warfare with animal agents infectious to man.

c) Radiation Hazards.—Active research is now being conducted on the effects of radioactivity on foodstuffs. The Veterinary Corps is training military veterinarians in practical radiology as it pertains to the effects on food-producing animals as well as prepared foods. This training is extremely

important in the preparation of defense against radiation hazards.

d) Disease Research.—Limited research is being conducted in diseases of animals transmissible to man. This research is confined to diseases of animals of particular military significance.

8) EFFECT OF FRAGMENTATION

When the Veterinary Corps was established in 1916, civilian veterinarians had been employed by the Army for duty with the quartermaster, cavalry, and artillery for many years; however, the value of combining this personnel into a single organization to promote efficiency was recognized and so debated by the Congress. To fragment the Veterinary Corps by distributing its personnel among other technical services would be a repetition of the situation that existed prior to 1916.

A single corps system facilitates personnel assignment, training, and conserves man power. It reduce requirements for staff and supervisory personnel and provides maximum flexibility in personnel utilization, thus eliminating any possibility of duplication.

By virtue of incorporating veterinary personnel into a single corps, technical supervision may be exercised from a single point and all efforts properly controlled and coordinated. This fact applies not only to routine operations but to the important factors of mobilization planning, research, and development.

As now organized the Veterinary Corps, as an integral part of the Medical Service, performs an invaluable service for the Surgeon General in maintaining the health of the Army. This service is not limited to the Army but extends, in many phases, to all of the Armed Forces. Elimination of the Veterinary Corps would, in effect, increase not only the workload but also a need for Medical Corps officers, since the veterinarian with his specialized training is able to relieve the medical officer of many essential responsibilties in the field of preventive medicine.

9) STUDIES CONCERNING THE ARMY VETERINARY CORPS

a) The Chief of Staff of the Army on July 31, 1954, directed the then Assistant Chief of Staff, G-4, to conduct a study on the Army Veterinary Corps. The purpose of the study was to determine:

1) the necessity for a Veterinary Corps in light of the reduced use of animals in our present organizational structure;
2) if the corps is still required, to determine its size;
3) to determine the need of a general officer in the Veterinary Corps;
4) to determine if food inspection could be accomplished by contract;

b) In complying with these directions from the Chief of Staff, a comprehensive study was completed within the office of the Deputy Chief of Staff for Logistics. This study was completed on Jan. 20, 1955, concluding:

1) that professional veterinarians are still necessary in the Army and some of their functions could never be replaced by contract services;
2) experience over generations led the government to give these professional personnel commissioned status in a separate corps of the Army Medical Service. No new experience suggests changing that policy;
3) the number of Regular Army officers in the Veterinary Corps fairly entitles them to one general officer under the career principles which apply to all Regular Army officers;
4) abolition of the Veterinary Corps in the assignment of the officers to the Quartermaster Corps, Chemical Corps, and the Army Medical Corps would diminish the effectiveness of their professional employment and training;
5) the fact that the Air Force also maintains a professional veterinary service of comparable size, headed by a brigadier general, indicates that the disappearance of horses and mules is not a factor in this matter;
6) the strength of the Veterinary Corps is subject to standard officer controls;
7) additional transfer of inspection responsibilities to the U.S. Department of Agriculture would not eliminate military veterinarians as a part of the Army in the field.

The study then recommended that no further action be taken to change the status of the United States Army Veterinary Corps. This study was approved by the Secretary of the Army on March 4, 1955.

THE NEWS

Laboratory Refresher Courses

The Department of Health, Education, and Welfare has announced a series of laboratory refresher training courses to be held at the Laboratory Branch of the Communicable Disease Center, Chamblee, Ga. The 22 courses, which vary from one to four weeks, begin on Sept. 10, 1956, and end on March 29, 1957. The subjects include laboratory diagnosis of bacterial, parasitic, viral, rickettsial, and mycotic infections. Further information may be obtained from: Laboratory Training Services, Communicable Disease Center, U. S. Public Health Service, P.O. Box 185, Chamblee, Ga.

Annual Meeting of American Animal Hospital Association

The twenty-third annual meeting of the American Animal Hospital Association was held in the Hotel Fontainebleau, Miami Beach, Fla., on May 23-26, 1956.

At the scientific session, the following guest speakers addressed the group: Alan Bachrach, Philadelphia (strictly for the birds); William C. Banks, A. & M. College of Texas, College Station (gadgets for radiology); Donald C. Beard, Concord, N. Car. (management of accident cases); Francis T. Candlin, University of Colorado, Denver (chronic solar dermatitis); Carl H. Clark, Alabama Polytechnic Institute, Auburn (canine electrocardiography); Francis N. Cooke (M.D.), University of Miami (aortic transplant); John T. Correll (Ph.D), Upjohn Co., Kalamazoo, Mich. (response of dogs to anticoagulent rodenticides); William I. Gay, National Institutes of Health, Bethesda, Md. (prosthesis of femoral head); Theodore J. Hage, University of California, Davis (gadgets for radiology); B. F. Hoerlein, Alabama Polytechnic Institute, Auburn (spinal fusion and immobilization); Brig. Gen. Wayne O. Kester, Washington, D.C., president-elect of the AVMA (greetings from AVMA); William P. Murphy, Jr. (M.D.), Miami, Fla. (reactivity of feline brain to foreign material); Charles B. Phillips, Mobile, Ala. (improving your grooming); S. F. Scheidy, University of Pennsylvania, Philadelphia (cortisone analogues); H. R. Seibold, Alabama Polytechnic Institute, Auburn (canine clinicopathological diagnosis); Hugh D. Simpson, Iowa State College, Ames (cataract correction with plastic lens); Clifford C. Snyder (M.D.), University of Miami (plastic surgical equipment); and Dorothy Errara, Miami (care of rubber gloves).

The following members also presented papers: James Archibald, University of Toronto, Guelph, Ont. (canine prostate); J. Kenneth Bone, Chicago (safer approach to general anesthesia); Charles W. Bower, Topeka, Kan. (professional dispensing); T. H. Brasmer, Danville, Ill. (an approach to dentistry); Wade O. Brinker, Michigan State University, East Lansing (comparison of frozen and lyophilized bone for grafting); Paul T. Candlin, Madison, Wis. (new anesthesia for the cat); E. J. Catcott, Ohio State University, Columbus, moderator, and Panelists W. G. Magrane, Mishawaka, Ind., S. R. Roberts, Richmond, Calif., and H. D. Simpson, Iowa State College, Ames (care of the canine eye); Louis A. Corwin, Jamaica, N.Y. (shortcuts); J. Stuart Crawford, New Hyde Park, N.Y. (extra hand on busy days); J. B. Engle, Summit, N.J. (preventive medicine for labor ills); Lester E. Fisher, Berwyn, Ill. (TV moderator); Julius J. Fishler, Elkhart, Ind. (care of the cat, radiology in a small animal hospital); George G. Freier, Benton Harbor, Mich. (care of the cat); William C. Glenney, Ardmore, Pa. (calibrating for x-ray therapy); S. W. Haigler, St. Louis, Mo. (more time for hunting); Darr Jobe, Temple City, Calif. (splinting the congenital coxofemoral subluxation); R. A. Leeper, Des Moines, Iowa, moderator, and Panelists Jack C. Baker, Birmingham, Ala., William J. Foster, Clifton, N.J., James E. Reed, Gastonia, N. Car., Peter S. Roy, Jacksonville, Fla., and A. C. Sears, Fort Worth, Texas (hospital construction); Philip L. McClave, Reseda, Calif. (elimination of coxofemoral dysplasia from a breeding kennel); Richard L. Ott, State College of Washington, Pullman (distemper immunization); Edgar E. Ruebush, Silver Spring, Md. (speculum for catheterizing a bitch); Ralph E. Ruggles, Moline, Ill. (planning an animal hospital); Aaron I. Stern, Waterbury, Conn. (radiation protection); Newton B. Tennille, Oklahoma A. & M. College, Stillwater (isotopes); Arthur R. Theobald, Cincinnati, Ohio (useful instruments); Myron A. Thom, Pasadena, Calif. (positioning for x ray); Stanley C. Wasman, Miami Beach, Fla. (basic operating room procedures); James H. Yarborough, Miami, Fla. (new instruments for extracting teeth); and William J. Zontine, Lancaster, Calif. (canine examination).

Social activities included the annual golf tournament at the Plantation Golf Club, swimming, tour of the seaquarium, the annual banquet, and a postconvention tour to Havana.

s/WAYNE H. RISER, *Executive Secretary.*

COMMENCEMENTS

Alabama Polytechnic Institute.—At the 1956 commencement exercises of the School of Veterinary Medicine, Alabama Polytechnic Institute, the following 63 candidates were presented for the D.V.M. degree:

J. Lee Alley
Charles A. Baldwin
Kenneth D. Barnett
William R. Bentley
Daniel G. Brown
William O. Butler
Edward P. Calvin
Neal R. Carlson
Edwin G. Clampett
Hugh D. Claughton
William J. Clements
James E. Cochran
John B. Cook
James O. Cox

George C. Davis
William W. Deans
James E. Dukes
Charles A. Duvall
Paul E. Fenwick
John E. Fountain
Richard J. Fuchs
James A. Gaskin
Arnold V. Geisemann
J. Frank Gravlee
Allen L. Harris
Joe L. Henson
Howard E. Hill
Clinton B. Hyatt
Robert C. Jamerson
Ingram P. Johnson
Nathan C. Johnson
William E. Johnson
Richard Z. Keene
Robert E. King
Kent V. Klinner
Rudolph C. Kolb
Grady E. Lanier
Eddie A. Levitt
Lucien D. Lewy
George C. Lott
Robert B. Mardre
Allen W. May
Oscar R. McAdams
Vastine S. McCrory
J. B. McCullough
H. Alton McDaniel
Harold D. McGee
Hubert E. McKinney
Ronald A. Meeks
Harry E. Nisbett

Graduating Class, 1956, School of Veterinary Medicine, Alabama Polytechnic Institute

Front row (left to right)—William W. Deans, Russell V. Skinner, William J. Clements, James A. Gaskin, Ralph P. Witt, Robert G. Tabbert, Van H. Robinson.

Second row—George C. Davis, Charles A. Duvall, Richard J. Fuchs, Robert C. Jamerson, Edwin G. Clampett, John B. Cook.

Third row—Paul E. Fenwick, Allen W. May, Joe L. Henson, Hugh D. Claughton, Hubert E. McKinney, Oscar R. McAdams, J. B. McCullough.

Fourth row—Richard Z. Keene, John E. Fountain, Robert E. King, Lucien D. Lewy, Vastine S. McCrory.

Fifth row—Allen L. Harris, Jere M. Phillips, Eddie A. Levitt, J. Lee Alley, George C. Lott, Rudolph C. Kolb.

Sixth row—James E. Cochran, Edward P. Calvin, William R. Bentley, Carl S. Pruitt, Neal R. Carlson, William R. Sinclair.

Seventh row—Samuel Ridout, Clinton B. Hyatt, Ronald A. Meeks, Carl S. Pruitt, Neal R. Carlson, William R. Sinclair.

Eighth row—Grady E. Lanier, Kenneth D. Barnett, Royce C. Parker, James O. Cox, Kent V. Klinner, Nathan C. Johnson.

Ninth row—James K. Terry, Charles R. Wallace, H. Alton McDaniel, Tyler E. Riggins, Harry E. Nisbett, J. Frank Gravlee, William E. Johnson.

Tenth row—Charles A. Baldwin, William O. Butler, Daniel G. Brown, Robert B. Mardre, Ingram P. Johnson, Robert P. Shields, Arnold V. Geisemann, Howard E. Hill.

Royce C. Parker
Jere M. Phillips
Carl S. Pruitt
Samuel Ridout
Tyler E. Riggins
Van H. Robinson
Robert P. Shields
William R. Sinclair
Russell V. Skinner
Robert G. Tabbert
James K. Terry
Charles R. Wallace
Ralph P. Witt

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University of Missouri.—At the 1956 commencement exercises of the School of Veterinary Medicine, University of Missouri, the following 29 candidates were presented for the D.V.M. degree:

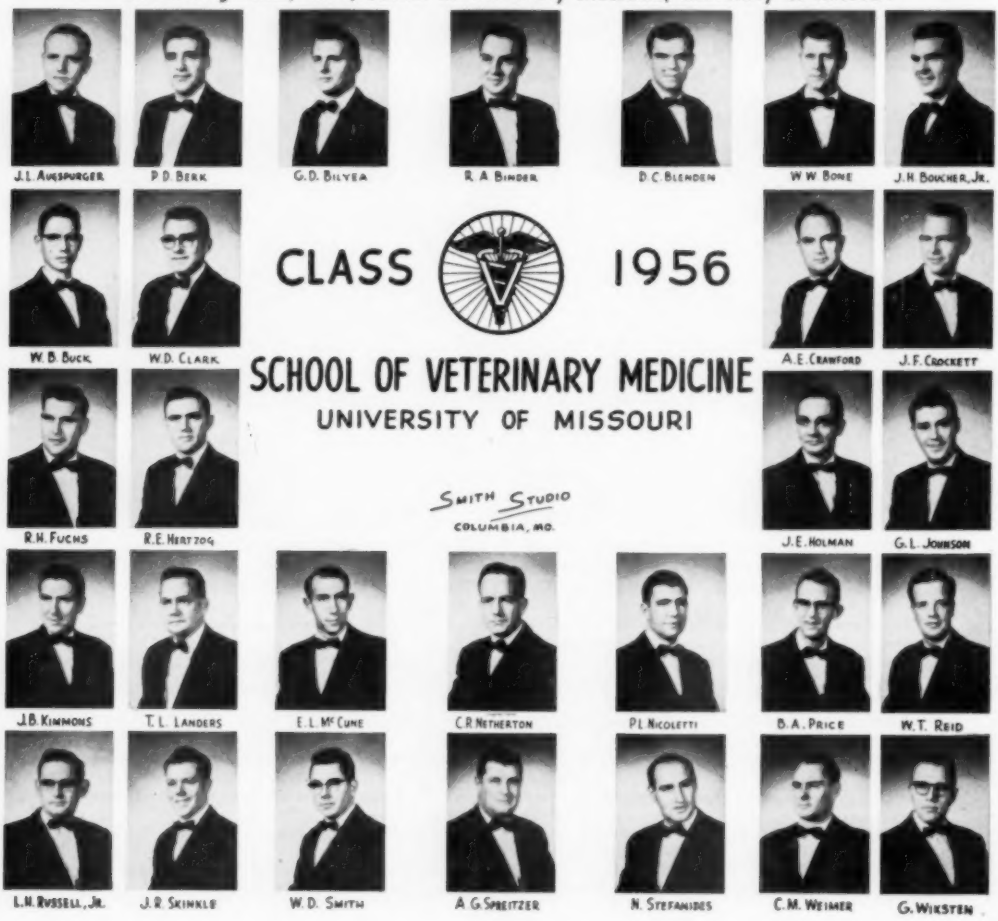
Jerry L. Augspurger
Peter D. Berk
George D. Bilyea
Richard A. Binder
Donald C. Blenden
Walter W. Bone
John H. Boucher, Jr.
William B. Buck
William D. Clark
August E. Crawford
James F. Crockett
Robert H. Fuchs
Robert E. Hertzog
John E. Holman
Gerald L. Johnson
John B. Kimmons
Thomas L. Landers
Emmett L. McCune
Charles R. Netherton
Paul L. Nicoletti
Bill A. Price
William T. Reid
Leon H. Russell
J. R. Skinkle
Wayne D. Smith
Allen G. Spreitzer
Norden V. Stefanides
Charles M. Weimer
Grauman Wiksten

U. S. GOVERNMENT

Dr. Paul J. Brandly Heads Biological Control Work.—Dr. Paul J. Brandly (KSC '33) has been selected to head the newly formed Biological Control Section in the Meat Inspection Branch of the U.S. Department of Agriculture at the Agricultural Research Center, Beltsville, Md.

Identifying pathological and bacteriological changes in meat and testing various control methods for making meat safe where parasites

Graduating Class, 1956, School of Veterinary Medicine, University of Missouri



are involved are part of the work of this section. Dr. Brandly and his staff will direct investigations by packers, suppliers, and research organizations to assure that additives or processing procedures are biologically acceptable and that the public is protected.

Dr. Paul J. Brandly

Prior to his appointment, Dr. Brandly served as food bacteriologist in the office of Dr. A. R. Miller, chief of the Meat Inspection Branch. Dr. Brandly's work on meat inspection problems includes an improvement of a serological method for identifying meat from different animals.

s/C. H. PALS, *Assistant Chief of Branch.*

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Veterinary Personnel Changes.—The following changes in the force of veterinarians in the U.S.D.A., Agricultural Research Service, are reported as of April 14, 1956.

TRANSFERS

Edward M. Krivacek, from South St. Paul, Minn., to Green Bay, Wis.

Robert P. McCoy, from Purcellville, Va., to New York, N.Y.

William J. Minor, from Green Bay, Wis., to Washington, D.C.

Clifton A. Niles, from St. Paul, Minn., to Montpelier, Vt.

AMONG THE STATES AND PROVINCES

Connecticut

Fairfield County Association.—The annual meeting of the Fairfield County Veterinary Medical Association was held on April 11, 1956, in Westport. Dr. H. C. Stephenson, consultant to the Cornell Research Laboratory for Diseases of Dogs, Ithaca, and editor of the "Veterinary Drug Encyclopedia," was the guest speaker. He presented a film, "Friend of a Friend," and also directed a discussion on newer aspects of virus diseases.

s/WILLIAM R. LEGGETT, *Secretary.*

Iowa

North Central Association.—The annual meeting of the North Central Iowa Veterinary Medical Association was held at the Warden Hotel, Fort Dodge, on April 19, 1956, and the following officers were elected: R. H. Ahrens, Jewell, president; Wayne Emerson, Eagle Grove, president-elect; and H. Engelbrecht, Fort Dodge, secretary-treasurer. Members elected to the executive board were: John Morton, Webster City; F. R. Rosdail, Pomeroy; and D. J. McKenna, Mallard.

The professional program was interesting and varied and included the following out-of-state speakers: Jean C. Flint, Colorado A. & M. College, Fort Collins (infectious rhinotracheitis of feedlot cattle); and Vernon K. Jensen, Montevideo, Minn. (swine practice).

The following speakers also addressed the group: R. L. Lundvall, Iowa State College, Ames (magnets to prevent traumatic gastritis); and Panelists F. H. Kelly, Goldfield; V. D. Ladwig, Sac City; D. J. McKenna, Mallard; C. L. Telleen, Gowrie; M. F. Wilson, Rockwell City; and Moderator Earl C. Ritter, Sumner (veterinary office dispensing). Drs. C. L Nelson, Sioux City, president of the Iowa V.M.A.; H. U. Garrett, Des Moines, state veterinarian; and C. W. Brown, Des Moines, of the U.S.D.A., also spoke briefly.

A color motion picture, "Rinderpest," produced by the U.S.D.A., was also shown.

s/H. ENGELBRECHT, *Secretary.*

Kansas

State Association Officers.—At the annual meeting of the Kansas Veterinary Medical Association, Feb. 5-7, 1956, the following officers were elected: T. J. Leasure, Lawrence, president; F. B. Ogilvie, Kansas City, vice-president; K. Maynard Curts, Kansas City, secretary-treasurer; James A. Porter, Jr., Fredonia, bulletin editor; Dean S. Folse, Manhattan, chairman of yearbook editorial board; A. V. Schwartz, Jr., Salina, convention manager, 1957; and K. Maynard Curts, AVMA resident secretary.

s/K. MAYNARD CURTS, *Secretary.*

Quebec

Veterinary Societies Hold Joint Session.—The Montreal, Quebec, and Lower Canada Veterinary Medical Societies met at the School of Veterinary Medicine in St. Hyacinthe on April 21, 1956. Approximately 150 persons attended this meeting which was in charge of Drs. Roland Filion, of the research laboratory at St. Hyacinthe, and Malcolm Baker, Montreal, presidents of the Montreal and Lower Canada Societies, respectively.

The following speakers addressed the group: H. C. Stephenson, Cornell University, Ithaca, N. Y. (treatment of small animals), and Georges Girard, assistant to the veterinary director general Ottawa (rabies).

The program also included a tour of the school of veterinary medicine and a banquet.

s/JACQUES SAINT-GEORGES, *Secretary, Quebec V.M.A.*

FOREIGN NEWS

Iranian Veterinary Officers Visit United States.—On April 2, Brig. Gen. Yadollah Sharif, chief of the veterinary section, and Col. Rahma Tollah Deyhimy, chief of the food inspection section, Animal Affairs Department of the Iranian Army, arrived in Washington, D.C., for a six-week tour of installations of the U.S. Army, the Public Health Service, the Quartermaster Corps, and the Department of Agriculture.

Their visits included the Department of Agriculture Experiment Station at Beltsville, Md., and the National Institutes of Health at Bethesda; Federal Food and Drug Administration Laboratories; Army Medical Service Meat and Dairy Hygiene School in Chicago; and the Fitzsimmons Army Hospital and Medical Nutrition Laboratory in Denver.

STATE BOARD EXAMINATIONS

Virginia—The Virginia State Board of Veterinary Examiners will give its annual examination June 28-29, 1956, in the Senate Chamber, Capitol Building, Richmond, Va. All applications must be filed prior to June 28, 1956. Requests for applications and additional information should be addressed to: Mr. Turner N. Burton, director, Department of Professional and Occupational Registration, Finance Bldg., P.O. Box 1-X, Richmond 2, Va.

DEATHS

Louis E. Baxter (UP '12), 71, Bernardsville, N. J., died April 11, 1956. Dr. Baxter, a veteran of World War I, was a past-president of the Morris County Chapter of the National Association for the Advancement of Colored People. He is survived by his widow and two daughters.

Ralph R. Claybaugh (CVC '14), 74, Freeport, Ill., died Jan. 20, 1956. Dr. Claybaugh was employed by the Division of Livestock Industry. He was a member of the Illinois Veterinary Medical Association.

Adolph G. Falk (CIN '06), 91, Hartley, Ohio, died Feb. 13, 1956. Dr. Falk had practiced in Cincinnati for many years prior to his retirement.

Ruben S. Gerber (CVC '13), 80, Dalton, Ohio, died March 13, 1956. Dr. Gerber started his practice in Dalton in 1913 and had practiced there continuously until 1955 when he retired due to poor health. He was active in civic and professional activities. His widow survives.

George Gordon (SF '04), 86, Sacramento, Calif., died March 26, 1956. Dr. Gordon had retired from practice several years ago. He is survived by two daughters and three brothers, one of whom, William D. Gordon (SF '14), practices in San Jose.

Arthur W. Hopkins (ONT '17), 64, Calgary, Alta., died March 13, 1956. Dr. Hopkins served in World War I, attaining the rank of captain. After a few years in general practice, he joined the Health of Animals Branch of the Canadian Department of Agriculture, where he served in the meat inspection section until 1941 when he was transferred to the contagious diseases section. Since 1951, he had held the post of veterinarian-in-charge of the Calgary subdistrict office, directing the tuberculosis eradication work in the area from Red Deer south to the border. Dr. Hopkins was held in high esteem by those who had worked with him. He is survived by his widow and a daughter.

E. A. Johnson (CVC '96), 85, Platteville, Wis., died March 5, 1956. Dr. Johnson had practiced for nearly 40 years in Platteville.

Philip F. R. Meyer (CIN '05), 76, Fort Worth, Texas, died April 12, 1956. Dr. Meyer, who was a government meat inspector for 35 years, retired in 1941. He was for many years a member of the AVMA. Dr. Meyer is survived by his widow, a son, and two grandchildren.

★**James T. Mills** (KCV '16), 69, Oklahoma City, Okla., died April 16, 1956. Dr. Mills had retired from the Bureau of Animal Industry in 1952. His last assignment was that of supervisor of stockyards inspection in Oklahoma City. He is survived by his widow.

Guy Phelps, Sr. (API '11), Montgomery, Ala., died March 24, 1956. Dr. Phelps had been Montgomery County rabies inspector since 1937 and had practiced in Montgomery since 1920. Survivors include the widow, two sons, and two grandchildren.

Leon L. Powell (API '17), 65, Yantley, Ala., died Feb. 8, 1956. Dr. Powell had retired from practice. He is survived by his widow.

★**Balbino Sanz G.** (MAD '07), 70, Santiago, Chile, died Nov. 30, 1955. Dr. Sanz, who taught in the veterinary school in Santiago, was a member of the Sociedad de Medicina Veterinaria de Chile and of the AVMA.

Floyd E. Woolley (ONT '04), 73, Davison, Mich., died Feb. 11, 1956. Dr. Woolley had practiced in Davison for 50 years.

★Indicates member of the AVMA.

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Reprint from the JOURNAL of the American Veterinary Medical Association
vol. 124, No. 927, Jan., 1954, pp. 19-20.
A Note on the Use of Surital Sodium Anesthesia in Swine
H. W. DUNNE, D.V.M., Ph.D., and Captain S. C. BENBROOK, V.C., U.S. Army
East Lansing, Michigan
Use of Surital Sodium and Curare in Small-Animal Surgery
W. O. Brinker, D.V.M., M.S.
Michigan State College
East Lansing, Mich.
Reprint, The North American Veterinarian, Vol. 32, December, 1951.
Surital Sodium Anesthesia in Canine Surgery
H. B. ROBERTS, D.V.M., W. E. WENDT, D.V.M., C. C. WAGNER, D.V.M., M.Sc.,
T. F. REUTNER, D.V.M., M.S.
Reprinted from VETERINARY MEDICINE, Vol. XLVII, No. 3, March 1952
Surital Sodium And Morphine Anesthe
In Canine Surgery
W. C. YOUNG, JR.,* D.V.M. and F. E. EADS
D.V.M., M.S., Detroit, Michi
Reprint from the JOURNAL of the American Veterinary Medical Association, vol. 122, No. 913, Mar., 1953.
Dosage Studies of Surital Sodium in Dogs
ROBERT F. BORGMAN D.V.M., M.S.
Asheville, North Carolina
Reprinted from VETERINARY MEDICINE, Vol. L, No. 8, p. 365, August 1
Intrathoracic Anesthesia In Cats
MARK STERNFELS, D.V.M., Mount Vernon, New York
Surital Sodium, A New Anesthetic and Hypnotic
Studies in Dogs
T. F. REUTNER, D.V.M., M.S., and O. M. GRUHZIT, M.S., M.D.
Detroit, Michigan
Reprint from the Journal of the American Veterinary Medical Association.
Surital Sodium Anesthesia in Dogs and Cats
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F. E. EADS, D.V.M., M.S., Detroit, Mich.
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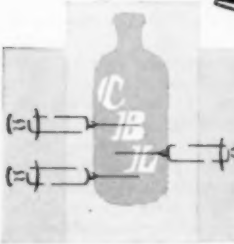

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WOMEN'S AUXILIARY

President—Mrs. Earl N. Moore, 636 Beall Ave., Wooster, Ohio.
Secretary—Mrs. F. R. Booth, 3920 E. Jackson Blvd., Elkhart, Ind.

How Members Can Best Serve Their Regional Auxiliary.—Recently, I had 15 candles on my anniversary cake, and one of my many thoughts of thanks that day was that these 15 years were spent as the wife of an active veterinarian. It was because of his chosen profession that I have met and worked with some of the finest people on this earth, the wives of fellow veterinarians. This privilege of association can come to all of us who heed a few simple responsibilities.

Certain obligations are due the Women's Auxiliary to the AVMA and the state auxiliaries but, most important to my way of thinking, is our responsibility to our local or regional auxiliary. It is with this group of local veterinarians' wives that a close and lasting friendship and understanding can and does develop.

I believe there are five simple but basic responsibilities, namely: attendance, promptness, an active interest, a willingness to serve, and thorough execution of assignments. These are so fundamental that we often forget them in this energized life of the twentieth century.

Attendance has been listed in the number one spot because I believe it to be the beginning of a firm foundation. Our lives are made up of a number of habits that keep us on schedule. If we, as wives, develop the habit of attending our local auxiliary every month, how much easier it will be for our husbands to attend, knowing that their wives wish to share in this experience also. In fact, this desire of ours to attend has been known to stimulate the doctors' attendance at veterinary medical meetings. We should be proud that we are able to help in this easy and enjoyable way.

But our pleasure in attendance can be embarrassed by a lack of the second responsibility—promptness. We, as women, are known the world over to be negligent toward this obligation. It seems that we allow too many incidentals to interfere with the big problem at hand. At the last minute, Nancy needs her hair pinned up, Bud's book report has to be checked for misspelled words and, on top of everything else, Bill can't find the treasurer's books that he must take to the meeting. You all know what I mean, but let's try being more efficient so that we can be prompt, not only in attendance but in answering correspondence and fulfilling other duties. These can become good habits.

We can be attentive and prompt but, if we show no active interest or willingness to serve, what a "dud" we are! Our librarian made the remark recently that if, as an individual, you could show no spark of motivation, at least be a "blocker" rather than to sit there like a "dud." He has a point but I know this to be impossible for, with the friendships made and interests developed, who could be a "dud" in an auxiliary meeting?

And then we come to the responsibilities of thoroughly completing our assignments. I can think of no one more selfish than the person who takes all he can get and gives as little as he can in return. By thoroughly completing every duty, we can again return in a small way some of the joys of being a veterinarian's wife.

If every one of us would think of these five responsibilities, I am sure we could accomplish our objectives as set forth in our constitution. I know of no better way to develop these responsibilities than to practice them in the regional auxiliary meetings.

s/(Mrs. W. G.) Elaine Magrane,
Elkhart, Ind.

• • •

Arizona Auxiliary.—The Women's Auxiliary to the Arizona Veterinary Medical Association met April 8, 1956, at the home of Mrs. Jack P. Fuller, for a card party, with prizes and refreshments. Mrs. Robert E. McComb and Mrs. Donald Fox, of Phoenix, past-presidents of the Auxiliary, presided.

The following women assisted with the afternoon activities: Mrs. Donald Miller, Phoenix, president; Mrs. K. O. Lassen, Mesa, vice-president; Mrs. Donald Watt, Glendale, treasurer; Mrs. Wm. E. Snodgrass, Glendale, publicity; Mrs. George Calderwood, Tempe, membership; and Mesdames A. E. Raimonde, Mesa; James E. Sharkey, Phoenix; E. R. Hinshaw, Buckeye; Dale Claybaker, Phoenix; and Sol Shapera, Phoenix.

The women joined their husbands at the Sahara Hotel for cocktails and a dinner meeting. Dr. J. G. Hardenbergh, executive secretary of the AVMA, was the guest speaker.

s/(Mrs. Wm. E.) Marjorie Snodgrass,
Publicity Chairman.

STUDENT CHAPTER ACTIVITIES

Illinois Chapter.—The University of Illinois Student Chapter of the AVMA held four regular meetings during the spring semester, at which the following speakers presented papers: Dr. Boyd Knupple, Greencastle, Ind. (methods and problems of private practice); Dr. Craig, Pitman-Moore Co., Indianapolis (use of hormones in practice); Mrs. Dahl of Lake Zurich, Ill., a breeder and judge of Collies (what dog breeders want in a veterinarian). Mrs. Dahl brought with her the only champion white Collie in the United States, which is owned by Ted Kjellstrom, a sophomore in the School of Veterinary Medicine. At a later meeting, Dr.

(*Continued on p. 24*)

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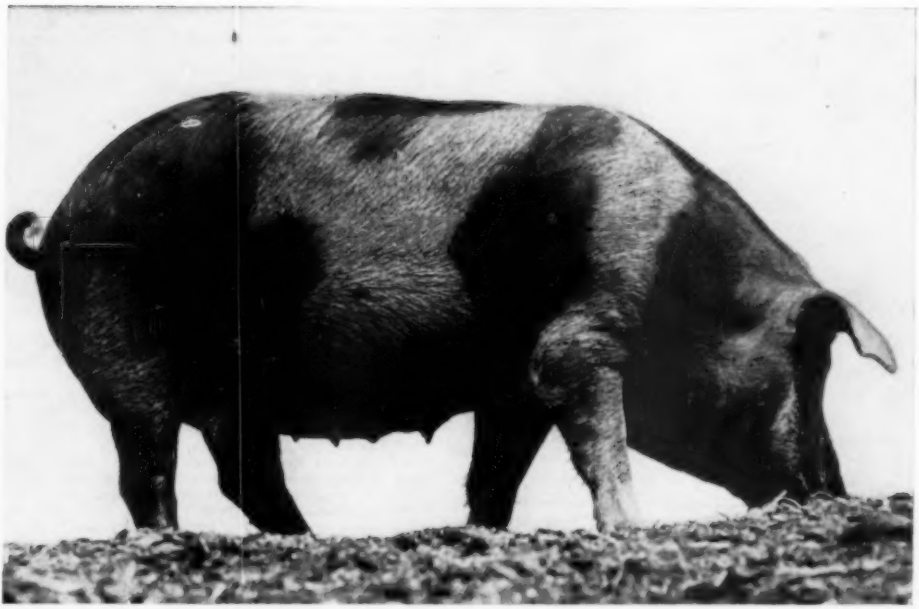

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COMING MEETINGS

Idaho Veterinary Medical Association. Summer meeting. Salmon City, Idaho, June 18-20, 1956. A. P. Schneider, 3025 N. Twenty-Third St., Boise, secretary.

Michigan State Veterinary Medical Association. Annual meeting. Bancroft Hotel, Saginaw, June 21-22, 1956. Paul V. Howard, 4011 Hungsberger, N.E., Grand Rapids, secretary.

Vermont Veterinary Medical Association. Annual summer conference. The Lodge at Smuggler's Notch, Stowe, June 21-22, 1956. A. E. Janawicz, Department of Agriculture, Montpelier, secretary.

Utah Veterinary Medical Association. Annual meeting. Auditorium of the Provo Power Utilities Bldg., Provo, June 21-22, 1956. B. N. Horstman, 3685 Riverdale Rd., Ogden, secretary.

Alberta Veterinary Medical Association. Annual convention. Macdonald Hotel, Edmonton, June 22-23, 1956. K. S. Pennifold, 11403-66 St., Edmonton, secretary.

North Dakota Veterinary Medical Association. Annual meeting. Jamestown, N. Dak., June 25-26, 1956. Dean Flagg, 202 Teton Ave., Bismarck, secretary.

North Carolina Veterinary Medical Association. Annual meeting. Greensboro, N. Car., June 25-27, 1956. Martin P. Hines, Raleigh, executive committee.

University of Wisconsin. Annual veterinary conference. University of Wisconsin, Madison, June 26-27, 1956 C. H. Brandly, head, Department of Veterinary Science.

Maritime Veterinary Associations. Annual joint conference. Mount Allison University, Sackville, N. B., June 26-28, 1956. J. F. Frank, P.O. Box 310, Sackville, chairman.

Wisconsin, University of. Postgraduate conference for veterinarians. University of Wisconsin, Madison, June 27-28, 1956. C. A. Brandly, head, Department of Veterinary Science.

Maryland State Veterinary Medical Association. Annual summer meeting. George Washington Hotel, Ocean City, Md., June 28-29, 1956. John D. Gadd, Cockeysville, Md., secretary.

Pacific Northwest Veterinary Medical Association (British Columbia, Oregon, Washington). Annual meeting. Vancouver, B. C., June 28-30, 1956. P. L. Stovell, 3187 W. Forty-Third Ave., Vancouver, coordinator.

South Carolina Association of Veterinarians. Summer meeting. Clemson House, Clemson College, S. Car., June 28-30, 1956. B. C. McLean, P. O. Box 432, Aiken, program chairman.

Mississippi State Veterinary Association. Annual meeting. Buena Vista Hotel, Biloxi, July 15-17, 1956. Harvey F. McCrory, P.O. Box 536, State College, secretary.

Kentucky Veterinary Medical Association. Annual meeting. Seelbach Hotel, Louisville, July 16-17, 1956. Robert H. Singer, 136 Shawnee Pl., Lexington, secretary.

Iowa State College. Annual conference for veterinarians. Memorial Union, Iowa State College, Ames, July 17-18, 1956. John B. Herrick, Iowa State College, Ames, co-chairman of conference.

Virginia Veterinary Medical Association. Summer meeting. Natural Bridge Hotel, Natural Bridge, July 17-19, 1956. Wilson B. Bell, 1303 Hillcrest Dr., Blacksburg, secretary.

Canadian Veterinary Association and the College of Veterinary Medicine of the Province of Quebec. Annual joint congress. Sheraton-Mont Royal Hotel, Montreal, July 19-21, 1956. Jacques St. Georges, publicity committee.

Alabama Polytechnic Institute. Annual conference for veterinarians. School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, Ala., July 22-25, 1956. R. S. Sugg, dean.

Veterinary Public Health Session, to be held in conjunction with the annual health conference, Pennsylvania State University, State College, Pa., on Aug. 21, 1956, at 2:00 p.m. Rabies, trichinosis, brucellosis, and food poisoning will be discussed. Ernest J. Witte, P.O. Box 90, Harrisburg, Pa., chief, Division of Veterinary Public Health.

Colorado Veterinary Medical Association. Annual meeting. Estes Park, Sept. 7-9, 1956. G. H. Gilbert, 5500 Wadsworth Blvd. Arvada, Colo., secretary.

Pennsylvania State Veterinary Medical Association. Annual meeting. Bedford Springs Hotel, Bedford, Pa., Sept. 12-14, 1956. Raymond C. Snyder, N.W. Corner Walnut St., and Copley Rd., Upper Darby, Pa., secretary.

New York State Veterinary Medical Society, Annual meeting. Concord Hotel, Kiamesha Lake, N. Y., Sept. 19-21, 1956. L. W. Goodman, 2303 Northern Blvd., Manhasset, general chairman; Miss Joan S. Halat, 803 Varick St., Utica, secretary.

Washington State Veterinary Medical Association. Annual meeting. Davenport Hotel, Spokane, Sept. 21-22, 1956. P. J. Pfarr, 6306 N. Wall St., Spokane 53, general chairman.

Oklahoma conference for veterinarians. School of Veterinary Medicine, Oklahoma A. & M. College, Stillwater, Sept. 27-28, 1956. A. L. Malle, Department of Veterinary Pathology, chairman.

Missouri, University of. Annual short course for veterinarians. School of Veterinary Medicine, University of Missouri, Columbia, Oct. 1-2, 1956. Cecil Elder, chairman, short course committee.

(Continued on p. 26)

STUDENT CHAPTER ACTIVITIES—*continued from p. 22*

Carl Vestling, Department of Biochemistry, University of Illinois, showed slides taken during his trip to Sweden.

The students were pleased with a new 40-cup coffee urn which was presented to them by the Women's Auxiliary to the Student Chapter.

s/JOHN AVES, *Secretary.*

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1. Mosier, J. E.: Vet. M. 50:605, 1955. 2. Brookey, R. S.; Holt, S. H., and Siegel, D.: J. Michigan M. Soc. 54:805, 1955.

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(COMING MEETINGS—*continued from p. 24*)

Eastern Iowa Veterinary Association, Inc. Annual meeting. Hotel Montrose, Cedar Rapids, Oct. 4-5, 1956. Forrest E. Brutsman, Traer, secretary.

American Veterinary Medical Association. Annual meeting. Municipal Auditorium, San Antonio, Texas, Oct. 15-18, 1956. J. G. Hardenbergh, 600 S. Michigan Ave., Chicago 5, Ill., executive secretary.

U. S. Livestock Sanitary Association. Annual meeting. Morrison Hotel, Chicago, Ill., Nov. 28-30, 1956. R. A. Hendershott, 33 Oak Lane, Trenton 8, N. J., secretary.

Animal Care Panel. Annual meeting. Morrison Hotel, Chicago, Ill., Nov. 29-30, 1956. Robert J. Flynn, P.O. Box 299, Lemont, Ill., secretary.

Nebraska Veterinary Medical Association. Annual meeting. Hotel Lincoln, Lincoln, Dec. 3-5, 1956. W. T. Spencer, 1250 North 37th St., Lincoln, secretary.

Foreign Meetings

Veterinary Conference, Jamaica Branch, British Caribbean Veterinary Association, Jamaica, B.W.I., July 28-Aug. 8, 1956. C. L. Bent, Veterinary Division, Department of Agriculture, Hope, Kingston, Jamaica, B.W.I. honorary secretary.

Tenth International Congress of Entomology. McGill University and University of Montreal, Montreal, Canada, Aug. 17-25, 1956. J. A. Downes, Division of Entomology, Science Service Bldg., Ottawa, Ont., Canada, secretary.

International Association of Hydatidology. Sixth Congress. Athens, Greece, Sept. 14-18, 1956. Prof. B. Kourias, 1 MacKenzie King St., Athens, Greece, general secretary

British Veterinary Association. Annual Congress. Royal Leamington Spa, Leamington, England, Sept. 16-22, 1956. Mr. F. Knight, 7, Mansfield St., Portland Pl., London, W.1, general secretary.

(*Continued on p. 28*)

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Regularly Scheduled Meetings

ALABAMA—Central Alabama Veterinary Association, the first Thursday of each month. B. M. Lauderdale, Montgomery, secretary.

Jefferson County Veterinary Medical Association, the second Thursday of each month. W. R. Laster, Jr., 213 N. 15th St., Birmingham, Ala., secretary.

ARIZONA—Central Arizona Veterinary Medical Association, the second Tuesday of each month. Keith T. Maddy, Phoenix, Ariz., secretary.

Pima County Veterinary Medical Association, the third Wednesday of each month in Tucson. E. T. Anderson, 8420 Tanque Verde Rd., Tucson, Ariz., secretary.

Southern Arizona Veterinary Medical Association, the third Wednesday of each month at 7:30 p.m. E. T. Anderson, Rt. 2, Box 697, Tucson, Ariz., secretary.

CALIFORNIA—Bay Counties Veterinary Medical Association, the second Tuesday of each month. E. Paul, Redwood City, Calif., secretary.

Central California Veterinary Medical Association, the fourth Tuesday of each month. Wilfred Pimentel, 3455 S. Elm Ave., Fresno, Calif., secretary.

East Bay Veterinary Medical Association, bimonthly, the fourth Wednesday. Leo Goldston, 3793 Broadway, Oakland 11, Calif., secretary.

Kern County Veterinary Medical Association, the first Thursday evening of each month. B. C. Watson, 825 14th St., Bakersfield, Calif., secretary.

Mid-Coast Veterinary Medical Association, the first Thursday of every even month. W. H. Rockey, P. O. Box 121, San Luis Obispo, Calif., secretary.

Monterey Bay Area Veterinary Medical Association, the third Wednesday of each month. Lewis J. Campbell, 90 Corral de Tierra, Salinas, Calif., secretary.

North San Joaquin Valley Veterinary Medical Association, the fourth Wednesday of each month at the Hotel Covell, in Modesto, Calif. Lyle A. Baker, Turlock, Calif., secretary.

Orange Belt Veterinary Medical Association, the second Monday of each month. Chester A. Maeda, 766 E. Highland Ave., San Bernardino, Calif., secretary.

Orange County Veterinary Medical Association, the third Thursday of each month. Donald E. Lind, 2643 N. Main St., Santa Ana, Calif., secretary.

Peninsula Veterinary Medical Association, the third Monday of each month. T. D. Harris, San Mateo, Calif., secretary.

Redwood Empire Veterinary Medical Association, the third Thursday of each month. Robert E. Clark, Napa, Calif., secretary.

Sacramento Valley Veterinary Medical Association, the second Wednesday of each month. W. E. Steinmetz, 4227 Freeport Blvd., Sacramento, Calif., secretary.

San Diego County Veterinary Medical Association, the fourth Tuesday of each month. H. R. Rossoll, 1795 Moore St., San Diego, Calif., secretary.

San Fernando Valley Veterinary Medical Association, the second Friday of each month at the Casa Escobar Restaurant in Studio City. John Chudacoff, 7912 Sepulveda Blvd., Van Nuys, secretary.

Southern California Veterinary Medical Association, the third Wednesday of each month. Howard C. Taylor, 2811 West Olive St., Burbank, Calif., secretary.

Tulare County Veterinarians, the second Thursday of each month. R. B. Barsaleau, 2333 E. Mineral King, Visalia, Calif., secretary.

COLORADO—Denver Area Veterinary Society, the fourth Tuesday of every month. Richard C. Tolley, 5060 S. Broadway St., Englewood, Colo., secretary.

Northern Colorado Veterinary Medical Society, the first Monday of each month. M. A. Hammarlund, School of

(*Continued on p. 30*)

here's the economy balling gun for dispensing to your clients

When you want to leave a balling gun with a client, you can't dispense a gun that costs you $3 or $4. That is why we had this economy model made. Made just for dispensing, it's a regular one-ounce size, standard 16½ inch gun. Singles cost $1.90; six, $10.85; and a dozen, $20.45. Order by number please.

JSA-3935, economy balling gun, six for $10.85.

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Jensen-Salsbery Laboratories, Inc.
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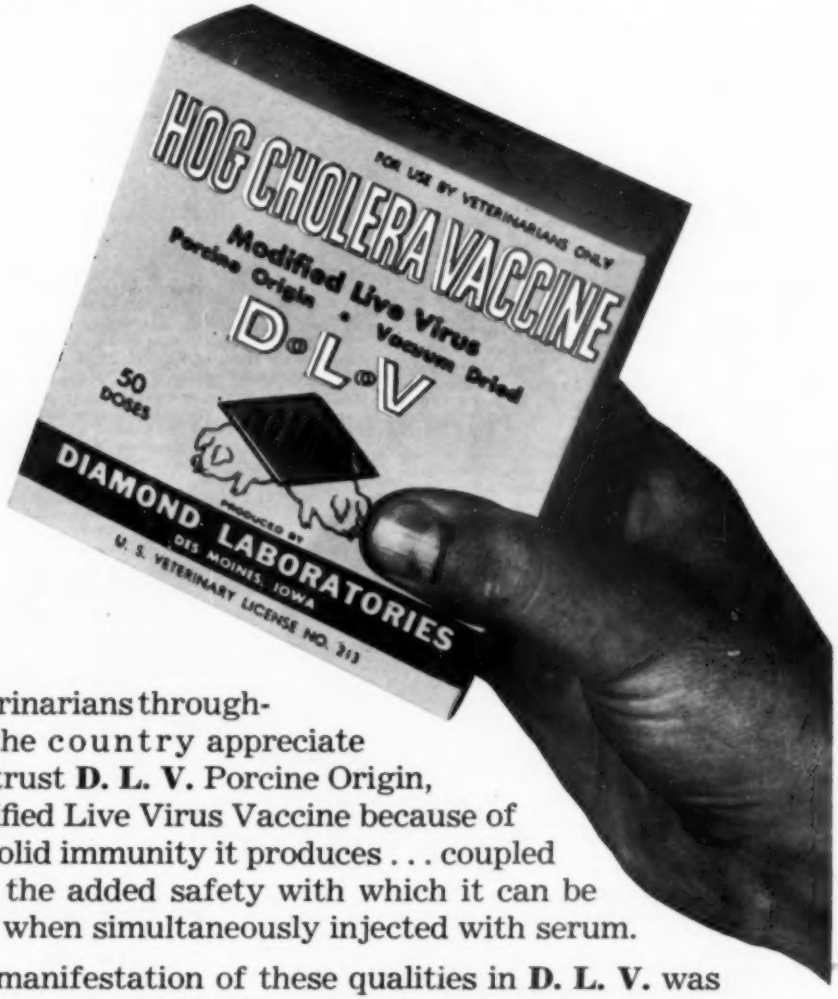
Why D-L-V Porcine Origin Vaccine is so Well Received.*



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The manifestation of these qualities in **D. L. V.** was evident in the successful vaccination of millions of swine.

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SERVING THE GRADUATE VETERINARIAN EXCLUSIVELY

Veterinary Medicine, Colorado A. & M. College, Fort Collins, Colo., secretary.

DELAWARE—New Castle County Veterinary Association, the first Tuesday of each month at 9:00 p.m. in the Hotel Rodney, Wilmington, Del. E. J. Hathaway, Clifton Park Manor, Apt. 73-5, Wilmington 2, Del., secretary.

FLORIDA—Jacksonville Veterinary Medical Association, the second Thursday of each month, time and place specified monthly. George F. Yopp, 4644 Main St., Jacksonville, Fla., Secretary.

Palm Beach Veterinary Society, the last Thursday of each month in the county office building at 810 Datura St., West Palm Beach. Ross E. Evans, 5215 S. Dixie Highway, West Palm Beach, Fla., secretary.

Ridge Veterinary Medical Association, the fourth Thursday of each month in Bartow, Fla. Paul J. Myers, Winter Haven, Fla., secretary.

South Florida Veterinary Society, the third Tuesday of each month, at the Seven Seas Restaurant, Miami, Fla. E. D. Stoddard, 6432 S. W. 8th St., Miami, Fla., secretary.

GEORGIA—Atlanta Veterinary Society, the second Tuesday of every month at the Elks Home on Peachtree St., Atlanta, Ga. J. L. Christopher, Smyrna, Ga., secretary.

ILLINOIS—Chicago Veterinary Medical Association, the second Tuesday of each month. Mark E. Davenport, Jr., 215 S. Edgewood Ave., LaGrange, Ill., secretary.

Eastern Illinois Veterinary Medical Association, the first Thursday of March, June, September, and December. A one-day clinic is held in May. H. S. Bryan, College of Veterinary Medicine, University of Illinois, Urbana, secretary.

INDIANA—Central Indiana Veterinary Medical Association, the second Wednesday of each month. Peter Johnson, Jr., 4410 N. Keystone Ave., Indianapolis 5, secretary.

Michiana Veterinary Medical Association, the second Thursday of every month, except July and December, at the Hotel LaSalle, South Bend, Ind. J. M. Carter, 3421 S. Main St., Elkhart, Ind., secretary.

Tenth District Veterinary Medical Association the third Thursday of each month. W. E. Sharp, Union City, Ind., secretary.

IOWA—Cedar Valley Veterinary Association, the second Monday of each month, except January, July, August, and October, at Black's Tea Room, Waterloo, Iowa. H. V. Henderson, Reinbeck, Iowa, secretary.

Coon Valley Veterinary Association, the second Wednesday of each month, September through May, at the Bradford Hotel, Storm Lake, Iowa. D. I. Lee, Sac City, Iowa, secretary.

Fayette County Veterinary Association, the third Tuesday of each month, except in July and August, at Pa and Ma's Restaurant, West Union, Iowa. Donald E. Moore, Box 178, Decorah, Iowa, secretary.

Northeast Iowa-Southern Minnesota Veterinary Association, the first Tuesday of February, May, August, and November at the Winneslick Hotel, Decorah, Iowa, 6:30 p.m. Donald E. Moore, Box 178, Decorah, Iowa, secretary.

KENTUCKY—Central Kentucky Veterinary Medical Association, the first Wednesday of each month. L. S. Shirrell, Versailles Rd., Frankfort, secretary.

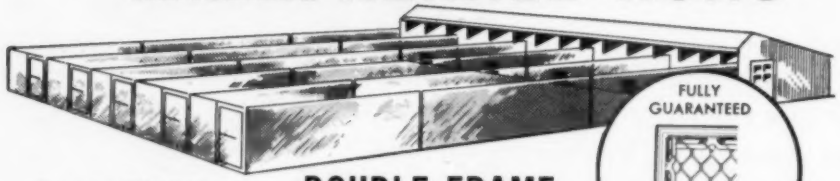
Jefferson County Veterinary Society of Kentucky, Inc., the first Wednesday evening of each month in Louisville or within a radius of 50 miles. W. E. Bewley, P.O. Box "H," Crestwood, secretary.

MARYLAND—Baltimore City Veterinary Medical Association, the second Thursday of each month, September through May (except December), at 9:00 p.m. at the Park Plaza Hotel, Charles and Madison St., Baltimore, Md. Harry L. Schultz, Jr., 9011 Harford Rd., Baltimore, Md., secretary.

MICHIGAN—Mid-State Veterinary Medical Association,

(*Continued on p. 32*)

Trouble-Free Galvanized KENNEL RUNS



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RED CEDAR SHAVINGS
in burlap bags
50 lb.—$4
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F.O.B. Indianapolis. No C.O.D.'s.

5 COMPARTMENT STALLS
Waterproof. Heavily galvanized sheets. 1½" angle iron frames braced and welded 1" pipe door frames with dog-proof mesh. Completely assembled. 2' and 3' interior stacking stalls also available. Satisfaction guaranteed.

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Ordinary mastitis ointment remains in a blob, restricting the ability of the ingredients to reach the infection.

PROOF

Terramycin®* Animal Formula for Mastitis diffuses immediately into the infected quarter

Terramycin Animal Formula for Mastitis reaches the infection quickly with full broad-spectrum action.

These photographs of translucent plastic "quarters" show the exceptionally rapid diffusion of Terramycin Animal Formula for Mastitis contrasted with the restricted spread of ordinary ointments. This is one of the reasons Terramycin Animal Formula for Mastitis is not only *effective*, but is *fast*.

Supplied: Tubes of ½ oz. and 10-dose vials. Each gram contains 30 mg. of calcium dioxytetracycline and 10,000 units of polymyxin B sulfate.

*Brand of oxytetracycline

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Veterinary Medicine, Colorado A. & M. College, Fort Collins, Colo., secretary.

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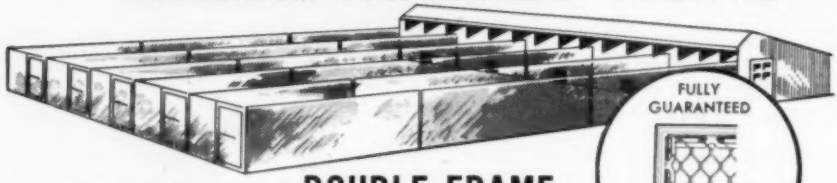

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RED CEDAR SHAVINGS
in burlap bags
50 lb.—$4
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F.O.B. Indianapolis. No C.O.D.'s.

5 COMPARTMENT STALLS

Waterproof. Heavily galvanized sheets. 1½" angle iron frames braced and welded 1" pipe door frames with dog-proof mesh. Completely assembled. 2' and 3' interior stacking stalls also available. Satisfaction guaranteed.

109-D West 21st St., Indianapolis, Indiana

Ford KENNEL EQUIPMENT

Write for the name of your nearest dealer.

Ordinary mastitis ointment remains in a blob, restricting the ability of the ingredients to reach the infection.

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Terramycin®* Animal Formula for Mastitis diffuses immediately into the infected quarter

Terramycin Animal Formula for Mastitis reaches the infection quickly with full broad-spectrum action.

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Supplied: Tubes of ½ oz. and 10-dose vials. Each gram contains 30 mg. of calcium dioxytetracycline and 10,000 units of polymyxin B sulfate.

*Brand of oxytetracycline

Department of Veterinary Medicine
PFIZER LABORATORIES
Division, Chas. Pfizer & Co., Inc.
Brooklyn 6, N. Y.

Pfizer

the fourth Thursday of each month with the exception of November and December. Robert E. Kader, 5034 Armstrong Rd., Lansing 17, Mich., secretary.

Saginaw Valley Veterinary Medical Association, the last Wednesday of each month. S. Correll, Rt. 1, Midland, Mich., secretary.

Southeastern Veterinary Medical Association, the fourth Wednesday of every month, September through May. Gilbert Meyer, 14003 E. Seven Mile Rd., Detroit 5, Mich., secretary.

MISSOURI—Greater St. Louis Veterinary Medical Association, the first Friday of the month (except July and August) at the Sheraton Hotel, Spring Ave. and Lindell Blvd. Allen B. Shopmaker, 136 N. Meramec, Clayton 5, Mo., secretary.

Kansas City Small Animal Hospital Association, the first Monday of each month, at alternating hospitals. W. F. Noland, 7504 Metcalf, Overland Park, Kan., secretary.

Kansas City Veterinary Medical Association, the third Tuesday of each month at Exchange Hall, ninth floor, Livestock Exchange Bldg., 1600 Genessee St., Kansas City, Mo. Busch Meredith, 800 Woodswether Rd., Kansas City 5, Mo., secretary.

NEW JERSEY—Central New Jersey Veterinary Medical Association, the second Thursday of November, January, March, and May at Old Hights Inn, Hightstown, N. J. David C. Tudor, Cranbury, N. J., secretary.

Metropolitan New Jersey Veterinary Medical Association, the third Wednesday evening of each month from October through April at the Academy of Medicine, 91 Lincoln Park South, Newark, N. J. Myron S. Arlein, 2172 Milburn Ave., Maplewood, N. J., secretary.

Northern New Jersey Veterinary Association, the fourth Tuesday of each month at the Casa Mana in Teaneck. James R. Tanzola, Upper Saddle River, secretary.

Southern New Jersey Veterinary Medical Association, the third Tuesday of each month at the Collingswood Veterinary Hospital, Collingswood. W. E. Snyder, E. Kings Highway and Munn Ave., Haddonfield, secretary.

NEW YORK—New York City, Inc., Veterinary Medical Association of, the first Wednesday of each month at the New York Academy of Sciences, 2 East 63rd St., New York City. C. E. DeCamp, 43 West 61st St., New York 23, N. Y., secretary.

Monroe County Veterinary Medical Association, the first Thursday of even-numbered months except August. Irwin Bircher, 50 University Ave., Rochester, N. Y., secretary.

NORTH CAROLINA—Central Carolina Veterinary Medical Association, the second Wednesday of each month at 7:00 p.m. in the O'Henry Hotel in Greensboro. J. W. Peace, High Point, secretary.

Eastern North Carolina Veterinary Medical Association, the first Friday of each month. Wm. Allen Potts, 401 W. James St., Mount Olive, secretary.

Piedmont Veterinary Medical Association, the last Friday of each month at 7:00 p.m. in Mull's Motel in Hickory, N. Car. W. W. Dickson, Box 1071, Gastonia, N. Car., secretary.

OHIO—Cuyahoga County Veterinary Medical Association, the first Wednesday of each month, September through May (except January), at 9:00 p.m. at the Carter Hotel, Cleveland, Ohio. Ed. R. Jacobs, 5522 Pearl Rd., Cleveland, Ohio, secretary.

OKLAHOMA—Oklahoma County Veterinary Medical Association, the second Wednesday of every month except July and August. James M. Brown, 2818 W. Britton Rd., Oklahoma City, secretary.

Tulsa Veterinary Medical Association, the third Thursday of each month in Directors' Parlor of the Brookside State Bank, Tulsa, Okla. Merle S. Watts, 5302 E. 11th St., Tulsa, Okla., secretary.

(*Continued on p. 35*)

Jen-Sal

small animal
therapy note

new! Jen-Sal's Cycloderm in a free-flowing lotion

New lotion formula of Jen-Sal's already outstanding external fungicide attacks fungi effectively by deep and rapid penetration of hair follicles. Odorless, non-staining, non-irritating Cycloderm Lotion can be dispensed for dry eczemas or ringworm to the complete satisfaction of you and your clients. Packaged in cartons of six – one oz. plastic squeeze bottles with slip-off labels.

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A Motorola Communications Engineer will give you the *full* story—in dollars and cents—show you how you'll make *more* calls in *less* time with Motorola 2-way radio. Write, phone or wire TODAY!

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2-WAY RADIO

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Motorola consistently supplies more mobile and portable radio than all others combined.
Proof of acceptance, experience and quality.
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"The best costs less—specify Motorola."

Now available to the veterinary profession...

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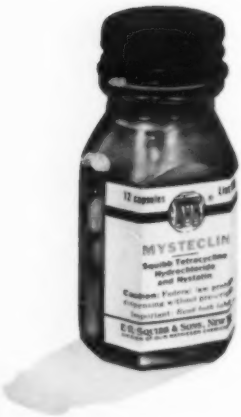

MYSTECLIN *contains today's broadest broad spectrum antibiotic*

TETRACYCLINE (Steclin)

PLUS *the first safe, effective antifungal antibiotic* **NYSTATIN** (Mycostatin)

all in one capsule!

MYSTECLIN is a *new* Squibb antibiotic preparation offering veterinarians—for the first time—the therapeutic advantages of broad anti-microbial spectrum, combined with protection against monilial superinfection.

Each capsule of Mysteclin contains 250 mg. Tetracycline HCl and 250,000 units Nystatin. Tetracycline HCl is distinguished for unusual therapeutic activity against both gram-positive and gram-negative organisms, and for the remarkably low incidence of undesirable side effects observed during its use. Nystatin is today's first safe, effective antifungal antibiotic, retarding the manifestation of monilial superinfection frequently the result of therapy with ordinary broad spectrum antibiotics.

SQUIBB QUALITY

—THE PRICELESS INGREDIENT

wide anti-microbial spectrum plus protection against monilial superinfection for safer small animal therapy

Mysteclin is indicated in the oral treatment of many common infections when caused by tetracycline-susceptible organisms (most gram-positive and gram-negative bacteria, certain large viruses, protozoa, and Rickettsiae), such as:

Abscess	Empyema	Panleukopenia
Actinomycosis	Feline Enteritis	Peritonitis
Bronchitis	Foal Diarrhea	Pharyngitis
Bronchopneumonia	Gangrene	Pig (Baby) Diarrhea
Burns, Infected	Gastroenteritis	Pneumonia
Calf Scours	Infectious Canine Hepatitis	Pyelonephritis
Calf Diphtheria	Lamb Diarrhea	Septic Sore Throat
Canine Distemper (Secondary Infection Of)	Laryngitis	Septicemia
	Leptospirosis	Strangles
Cellulitis	Meningitis	Surgical Prophylaxis
Colitis	Metritis	Tonsillitis
Cystitis	Navel Ill	Tracheobronchitis
Diarrheas, Infectious	Necrotic Stomatitis	Urethritis
Dysentery	Otitis Media	Wounds, Infected

MYSTECLIN offers you several advantages over other commonly prescribed broad spectrum antibiotics:

- **retards the danger of monilial overgrowth.**
  Clinical tests with humans indicate that – using Mysteclin – the monilia count in stools decreased in 68% of cases treated. With Tetracycline alone, monilia count increased in 73% of cases treated.*
- **causes fewer gastrointestinal side effects.**
- **produces higher blood levels.**
- **crosses the intact meningeal barrier more readily.**
- **reaches higher levels in the urine.**

*Newcomer, V. D., Wright, E. T., and Sternberg, T. H.: Antibiotics Annual 1954-55, New York, Medical Encyclopedia, Inc., 1955, p. 686.

administration and dosage: **Administration is by the oral route. Dosage (daily, in divided doses):**
Large animals: 5 to 10 mg. per pound.
Small animals: 25 to 50 mg. per pound.

MYSTECLIN is available upon prescription from your pharmacy, through your wholesaler, or from your favorite veterinary supply house. For further information, write: SQUIBB, *Veterinary Products Department*, 745 Fifth Avenue, New York 22, N. Y.

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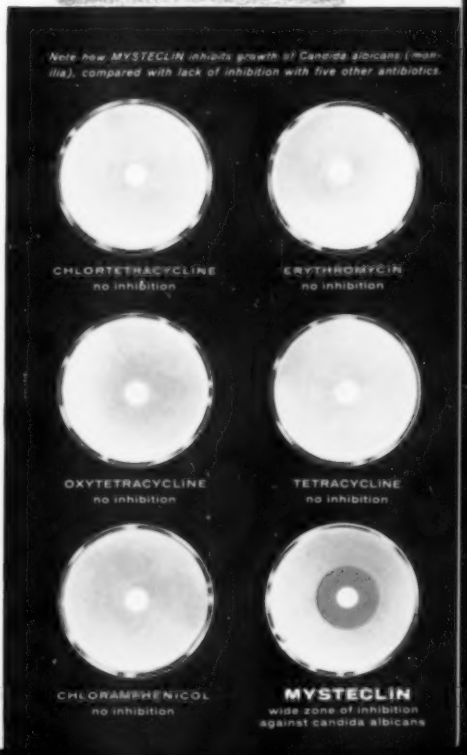

We know meat. You know dogs. But we *both* know that protein is the key essential to a dog's good health. That's why *extra amounts* of meat protein go into Pard Meal . . . more than is found in any other leading dry dog food. It's first choice for flavor, too . . . dogs preferred it 2 to 1 in actual feeding tests. Because Pard Meal is so concentrated in complete food values, you can feed up to 25% less by volume. Now available in both flake and crumble textures—25- or 50-lb. bags.

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New Pard Meal is so rich in concentrated food value that, pail for pail, *you feed less* . . . up to 25% less than with other leading dry-type meals. Ask your Swift man to show you a comparative feeding chart.

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"Where's my Pard?" Dogs can't help clamoring for Swift's canned Pard . . . it's made with the GOOD BEEF TASTE that comes from juicy beef variety meats, ground beef bone and just the right amount of beef fat. There's as much nourishment in one can as there is in a *human* dinner of roast beef, green beans and mashed potatoes. Swift's Pard is all a dog needs or wants!

immunize against distemper and hepatitis with one single shot...

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R_L's "reconstitiquick" feature means Sin-jex reconstitutes instantly in a fine, homogenous suspension which passes readily through a 22 gauge needle. Sin-jex requires a simple subcutaneous injection which may be given before or after weaning—simultaneously with or without Anti-Canine Distemper Serum and Anti-Infectious Hepatitis Serum (Bival Sera R_L).

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distemper hepatitis
sin-jex
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High tissue levels

Broad coverage

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Many dosage forms

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Set of above four — postpaid $50.00

These patented "championship" forms are patterned after markings of winners of top honors in show competition. Forms for other breeds made on special order. Sold to veterinarians only. Send check or money order.

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Official organ of American Society of Parasitologists

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It also publishes the program and abstracts for the annual meeting of the American Society of Parasitologists in a Supplement.

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GEORGE R. LA RUE

CHAIRMAN, EDITORIAL COMMITTEE

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Zoological Division
Beltsville, Maryland

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Assistant veterinarian wanted for small animal hospital in New Jersey; state all details, qualifications, and salary in first letter. Guaranteed time off. Possibilities for future if right man. Address "Box M 6," c/o JOURNAL of the AVMA.

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Position desired in physiological or nutritional research; D.V.M. and Ph.D. from accredited school; 12 years of experience. Address "Box M 2," c/o JOURNAL of the AVMA.

Recent graduate with experience in diagnostic laboratory, now engaged in successful large animal practice, seeks position with ethical commercial concern in the East. Address "Box M 3," c/o JOURNAL of the AVMA.

Veterinarian, Tuskegee graduate, desires position as relief, or assistant, in New York, north or central New Jersey; part-time basis. Experience more important than salary. Address "Box M 5," c/o JOURNAL of the AVMA.

Wanted—Practices

Want to purchase predominantly dairy or large animal practice in northern Middlewest state. Address "Box M 6," c/o JOURNAL of the AVMA.

(*Continued on p. 40*)

NOT TOUGH ENOUGH

. . . to fight car sickness. Help him out with

BONAMINE*

BRAND OF MECLIZINE HYDROCHLORIDE

Prevent car sickness effectively with a single daily dose

Bonamine is also indicated:

- to control nausea of worming
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- to prevent regurgitation in brachycephalics
- where a mild calming effect is desired
- whenever a reliable anti-nauseant is required

Daily Dosage: ½ tablet for animals 2 to 5 lb. in weight, 1 tablet for 5 to 20 lb., 1 to 2 tablets for 20 to 50 lb., and 2 to 3 tablets for larger animals.

Supplied: Bonamine Tablets, 25 mg., in boxes of 8; bottles of 100 and 500.

*TRADEMARK

Department of Veterinary Medicine Pfizer PFIZER LABORATORIES, Brooklyn 6, N. Y.
Division, Chas. Pfizer & Co., Inc.

For Sale or Lease—Practices

For semi-retired veterinarian, beautiful mountain home; office in basement. No competition. Price $18,500; must have $10,000 down. Area growing. Address Dr. J. D. Cozzens, Box 866, Big Bear Lake, Calif.

Excellent, newly established, small animal clinic for sale in large Texas city; has great potentialities; $10,000 down plus inventory (optional). Will finance balance. Address "Box M 7," c/o JOURNAL of the AVMA.

Dairy Losses in Western Floods

Many animals were lost during the late December floods in California and Oregon, including about 6,000 dairy cattle in one area. In addition to death losses, the udders were damaged on many cows so they could not be milked and other cows went dry. In other areas, there was no electricity to operate milking machines and hand milkers were not available. Some operated the milking machines from vacuum units on their automobiles. —*West. Dai. J., Feb., 1956.*

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Well-established, 30-cage, small animal hospital for sale in rapidly growing area in eastern Massachusetts. Firm price of $25,000 includes drugs, instruments, equipment, and real estate. Address "Box M 1," c/o JOURNAL of the AVMA.

Miscellaneous

Breedersleve—The disposable obstetrical sleeve. Package of 20 with detachable chest band, $5.00; lower wholesale price. Free sample upon request. Breeders Equipment Co., Flourtown, Pa.

Pregnancy diagnosis in mares—45th to 150th day. Request mailing tubes; $7.00, 2 or more, $6.00 each. Pregnancy Diagnostic Laboratories, Dysart, Iowa.

How to Prolong Your Life

You can live longer (and happier) than you think! Statisticians may predict a life span of 60 to 65 years for you; doctors may have set a time limit; you yourself may think you know when the insurance company is going to pay off on your life — but you can fool them all, including yourself. All it takes is the will to live and the desire to have a good time while you're willing it.

The eminent psychiatrist, Dr. Karl Menninger, made this statement: "In the end each man kills himself in his own selected way, fast or slow, soon or late."

For a longer and happier life, keep these eight tips in mind:

1) Quit worrying about your health.
2) Have fun.
3) Enjoy work, but don't live solely for it.
4) Conquer your work jitters.
5) Keep life simple and be satisfied with what you have.
6) Make the most out of the present.
7) Make family life mutually enjoyable.
8) Don't blow your top.

— *Executive's Digest, Oct., 1955.*

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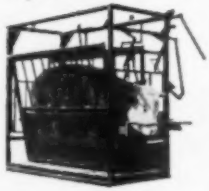

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MAJOR ADVANTAGES: 1. Wide field of usefulness: epidural, topical, infiltration and nerve block anesthesia. 2. Rapid in onset. 3. Effective in low concentration. 4. Low order of toxicity.

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CYCLAINE (Veterinary) is available in 2 forms. *1% Solution* for *infiltration* and *nerve block*, and also for *epidural anesthesia in dogs; supplied* in rubber-capped bottles of 100 cc. For *epidural anesthesia in large animals* and for *topical anesthesia, 5% solution* is *supplied* in rubber-capped vials of 20 cc.

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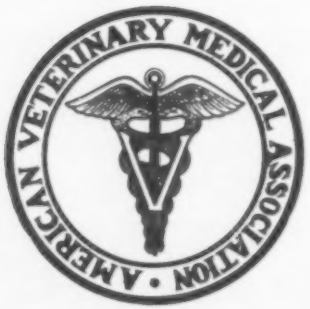

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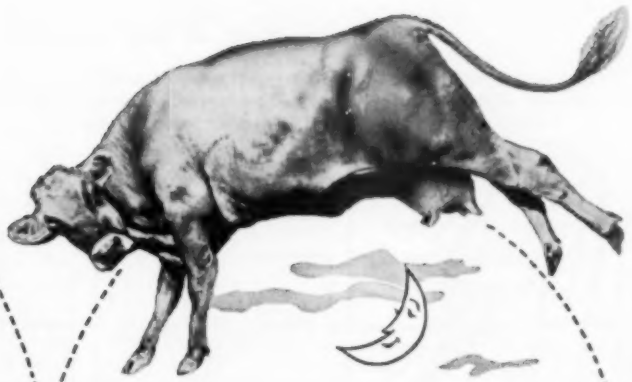

NLC wound treatments

NLC BOROFORM POWDER

An antiseptic, astringent and desiccant. Simply dust freely into and around wound, or on dressing. Contains: methylene blue, cresylic acid, alum, tannin, camphor, and deodorized iodoform base.

12/4-oz. containers with sifter top and dispensing label $3.50

NLC PYTANNOL

A vulnerary germicide, astringent and fly repellant. Simply apply freely with dauber or spray. Contains: pyoktannin blue, tannic acid, phenol, oil of cloves and special base. Available with either quick-drying base; or with slow-drying base, which keeps tissues soft and helps prevent excessive scar tissue.

12/4-oz. vials with dauber and dispensing label. Quick-drying $5.40
Slow-drying $6.40

Also available in pints and gallons.

NLC SCARLET OIL

A stimulating antiseptic, wound dressing and fly repellant. Oleaginous property helps keep puncture wounds open for drainage. Simply apply with dauber or syringe, or on dressing. Contains: phenol, gum camphor, white oil camphor, oil of pine, oil of eucalyptus, menthol, thymol, scarlet red and bland oils. Also available with castor oil (heavy) base.

12/4-oz. bottles with dauber and dispensing label. With light base..... $3.65
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Also available in pints and gallons.

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Apply on new wounds to prevent infestation with screw worms. Kills flies that settle on the wound. Also effectively kills screw worms in current infestations, and prevents re-infestation for 8-10 days.

* The PLUS stands for Sulfanilamide—an excellent bactericide, added to expedite healing of the wound. Lessens chance of bacterial infection.

12/4-oz. dauber bottles with dispensing label $5.25

Also available in gallons.

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THE
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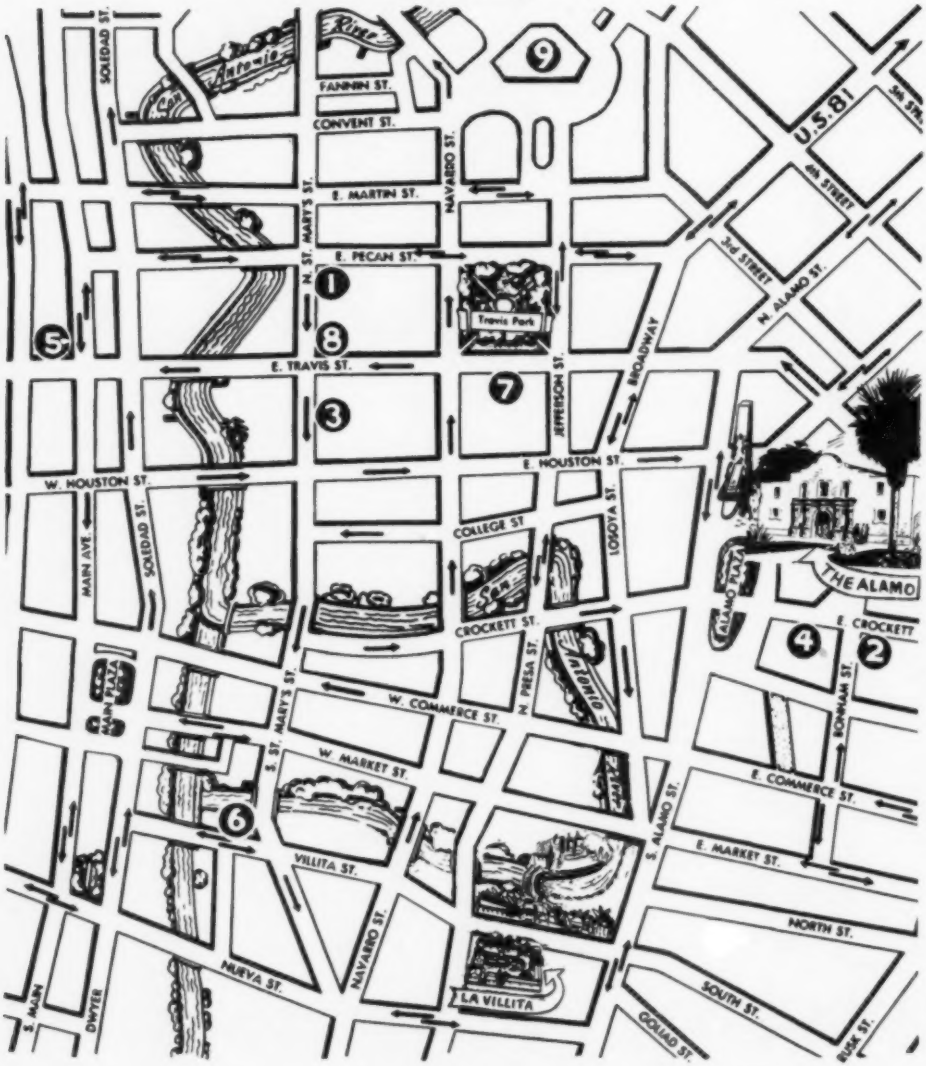
KANSAS CITY

Hotel Map of San Antonio

The general sessions and larger section meetings will be held at the Municipal Auditorium (No. 9). The smaller section meetings will be held at the Gunter Hotel (No. 3).



1. Blue Bonnet Hotel
2. Crockett Hotel
3. Gunter Hotel
4. Menger Hotel
5. Robert E. Lee Hotel
6. Plaza Hotel
7. St. Anthony Hotel
8. White Plaza Hotel
9. Auditorium

Motel Information—Motels listed on the reservation form are located on Austin Highway, U.S. 81, which enters San Antonio via Broadway. Rio Lado Motel is at 1100 N. St. Mary's St., near the business section.

HOTEL RESERVATIONS — SAN ANTONIO CONVENTION

Ninety-Third Annual AVMA Meeting, Oct. 15-18, 1956

All requests for hotel accommodations will be handled by a Housing Bureau in cooperation with the Committee on Local Arrangements. The Bureau will clear all requests and confirm reservations.

Hotels—Motels and Rates (all are air-conditioned)

HOTEL	SINGLE	DOUBLE	TWIN BEDS
1. Blue Bonnet	$3.00-5.00	$5.00-8.00	$.....
2. Crockett	$3.50-4.50	$5.50-6.50	.....
3. Gunter	$5.00 and up	$6.50 and up	.....
4. Menger	$5.00-8.00	$7.00-12.00	.....
5. Robert E. Lee	$3.50-5.00	$5.00-6.00	$6.00-8.00
6. St. Anthony	$5.00 and up	$7.00 and up	.....
7. White Plaza	$3.25 and up	$4.75 and up	.....

MOTEL	RATES
1. Aero	$7.50-9.00
2. Aloha	$6.00 and up
3. Belvedere	$6.00-10.00
4. Casa Linda	$6.00 and up
5. Koronado	$5.00 and up
6. Park	$4.00-15.00
7. Rio Lado	$6.00-10.00
8. The Westerner	$5.00 and up
9. Flamingo	$6.00 and up

Tear Here

RESERVATION FORM — AVMA CONVENTION — SAN ANTONIO

To: HOUSING BUREAU, San Antonio Visitors and Information Department, Chamber of Commerce, Insurance Building, San Antonio 5, Texas.

Please make reservations indicated below:

HOTEL

———Single room(s) at $_____

———Double bed room(s) at $_____

———Twin-bed room(s) at $_____

———Suite (specify type of accommodations wanted)

(Three choices MUST be shown)

First choice hotel _____

Second choice hotel _____

Third choice hotel _____

MOTEL

Indicate type of accommodations

(_____)
Unit, Cabin,

wanted for _____ persons at $_____
No. rate

(Three choices MUST be shown)

First choice motel _____

Second choice motel _____

Third choice motel _____

Arriving on (date) _____ at _____ a.m. _____ p.m.

Leaving on (date) _____ at _____ a.m. _____ p.m.

Will be occupied by (attach list of additional names if necessary).

Your Name (Print or Type) _____

Street Address _____ City and State or Province _____

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GAINES MEAL
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because the special Gaines homogenizing process combines ingredients of the Gaines formula into appetizing granules—each granule containing uniform amounts of every food element dogs are known to need.
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"Nourishes EVERY INCH of a Dog"

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USED SUCCESSFULLY
OVER 30 YEARS. YOU GET . . .

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- No maggots
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Ask your dealer for the original bloodless castrator made by La "Burdizzo" Co., Turin, Italy

BE SURE IT'S STAMPED WITH THE WORD **BURDIZZO**

Index to Advertisers in This Issue

Abbott Laboratories	27
Affiliated Laboratories Corporation	13
Allied Mills	40
Armour Veterinary Laboratories	10, 11
Ashe Lockhart, Inc.	3rd cover
Associated Veterinary Laboratories, Inc.	4, 5
AVMA Emblems	42
AVMA Directory	34
Burdizzo	47
Corn Belt Laboratories, Inc.	21
Corn States Laboratories, Inc.	2nd cover
Diamond Laboratories	29
Eaton Laboratories	25
Ellfield Laboratories	15
Ford Kennel Equipment	30
Fort Dodge Laboratories	18
Gaines Dog Food	46
Haver-Glover Laboratories	48
Hill Packing Company	35
Hotel Reservations	44, 45
Jensen-Salsbery Laboratories, Inc.	28, 32, 4th cover
Journal of Parasitology	38
Kirschner Manufacturing Company	8
Lederle Laboratories	36, 37
Lionhaven, Ltd.	14
MacAllan Laboratories	38
Menley & James, Ltd.	47
Motorola Communications & Electronics, Inc.	Insert facing p. 32
National Laboratories Corporation	43
Norden Laboratories	1
Nutritional Research Associates	24
Parke, Davis & Company	19
Pfizer Laboratories	31, 39
Pitman-Moore Company	3
Professional Printing Company, Inc.	38
Publishers' Authorized Bindery Service	26
Research Laboratories, Inc.	33
Schering Corp.	17, Insert between pp. 16-17
Sharp & Dohme, Div. Merck & Co., Inc.	41
Squibb	Insert between pp. 32-33
Sunbeam Corporation	26
Swift and Company	Insert facing p. 33
Upjohn and Company	23
U.S. Chemical Co., Inc.	16
Warren Teed Products Co.	7
Whitmire Research Laboratories, Inc.	9
WW Cattle Chute Company	40

yes, I'd welcome samples of both—

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PLAIN OINTMENT

Indicated primarily for its iodine content—as in swollen glands, boils, minor wounds, skin eruptions, irritations and infections.

IODEX
GUM METHYL SALICYLATE OINTMENT

Indicated for its counter-irritant action—as in lameness, strains, and other painful muscle, tendon and joint involvement.

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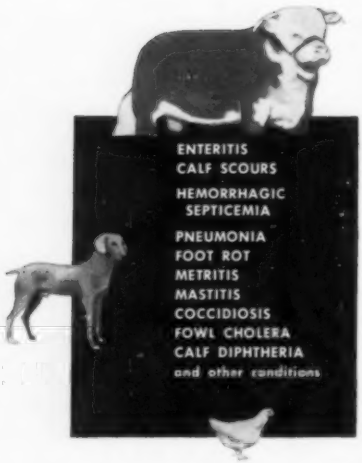

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ALOGEN

Canine Distemper Vaccine in Bronchisepticus-Streptococcus-Typhimurium Bacterin.

Introducing two new members of the
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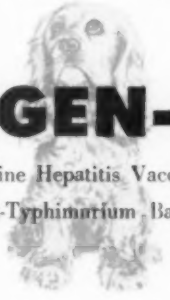

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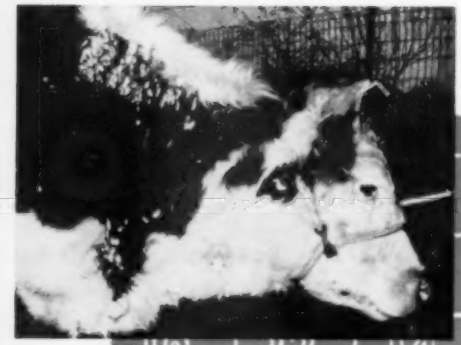

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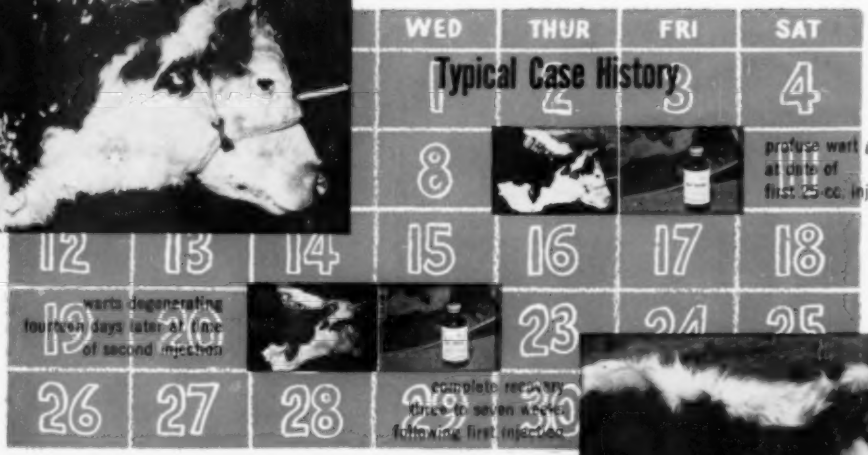
WED
THUR
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Typical Case History
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warts degenerating fourteen days later at time of second injection
complete recovery three to seven weeks following first injection

to this

after 2 injections!

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